CHEMICAL LIBRARY
JAN 30 1919
UNIV. OF ILL.

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXLIV. No. 2901.] LONDON, DECEMBER 17, 1918. [70TH YEAR. PRICE 6d.

London Office: ELEMENT MANSIONS, BROADWAY, WESTMINSTER, S.W. 1.

R. & J. DEMPSTER, LTD., MANCHESTER.

"NOTANOS" PAN ASH, COKE BREEZE & COAL WASHER.

HEAD, WRIGHTSON, & CO., LD. SOLE MAKERS OF THE

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C. 2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 LONDON WALL.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders, Structural Work.
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
SULPHATE OF AMMONIA PLANT
W. NEILL & SON, LD.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'NEILL, ST. HELENS.' Telephone No. 20.

PURIFYING MATERIAL
"Brownox-de-Luxe."
Unqualified Satisfaction given where used.
SPENT OXIDE PURCHASED
J. BROWN & CO., Ltd.
Savile Town, DEWSBURY.

TORBAY
JOINT
STOPPING
FREE FROM LEAD.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., LTD.,
STOCKTON-ON-TEES.
Complete GAS WORKS
London Office
39, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on page III. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

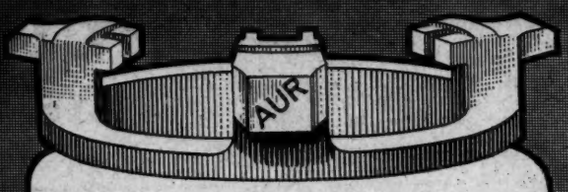
ESTABLISHED
— 1861 —
Telegrams:
"DRY METERS, LONDON."
Telephone:
KENSINGTON, 1140.

George Glover and Co., Ltd.
RANELAGH WORKS
Royal Avenue, Chelsea
LONDON, S.W., 3.

Highest Awards at the Principal International Exhibitions.
Branches at LEEDS (9, Dewsbury Road) and MANCHESTER (Gaythorn Meter Works, Easton St.).

SPECIALISTS IN DRY GAS METERS—SLOT, KEY, AND ORDINARY.
Every meter leaving GEORGE GLOVER AND CO.'s works, irrespective of size—and they build up to 3000 Lights—is regulated and tested for soundness at 12 in. pressure, and for registration not only at the ½ in. pressure prescribed by the "Sales of Gas Act," but at 3 in. pressure with full outlet capacity, so as to prevent "slow" registration even when the meter is overworked.
AGENTS FOR THE PATENT M. & M. SELF-LOCKING SLOT METER PADLOCK.

KITCHIE C.I. PIPES FOR GAS & WATER. MIDDLESBROUGH.



The Welsbach Light Co., Ltd.

THE
WELSBACH
LIGHT CO., LTD.
Welsbach House,
KING'S CROSS,
London, W.C.1
There Are No Better Mantles Made

is an ALL British Company

The Welsbach Factory produces the largest number of Mantles of all Factories in the United Kingdom.

DONKIN

for

GAS EXHAUSTING PLANTS.

VALVES, REGULATORS AND GOVERNORS, COMPRESSORS.

THE BRYAN DONKIN COMPANY, LTD.,

Head Offices & Works, CHESTERFIELD.

LONDON OFFICE: 3 VICTORIA STREET, WESTMINSTER, S.W, 1.

Chesterfield Telephone No. 84.
London Telephone No. 5358 Victoria.

Chesterfield Telegrams, "Donkin, Chesterfield."
London Telegrams, "Donkin, Vic. London."

CONTENTS.

EDITORIAL NOTES.

A Strong Organization of Gas Undertakings. 605
The Rationale of Continued Benzol Extraction 605
L.C.C. and Calorific Value and Inerts . . 606
Demobilization and Available Employment . 606
The Tar Agreement Period—Salaries in the Gas Industry—More Oil and Lower Cost—Coal Delivery Priority 607

Coal and Oil Supplies—Important Notice . 608
Notification of Lighting Concession . . . 608
Personal 608
Proper Combustion Methods 608
Inclined Chamber Ovens 608
Tar Sale and Purchase Scheme—Period of Agreement—Final Draft of Proposals . . 609
Gas Acts for 1918 610
A Chapter in the War Time Labour History of Gas-Works—Women Workers in the Retort-House 611
Electricity Supply Memoranda 613
Demobilization: Some Difficulties. By a Correspondent 614
Benzol as a Motor Fuel. By S. E. Whitehead 615
Institution of Gas Engineers—Minutes of Council Meeting 617
Coal and Health. Lecture by Prof. W. A. Bone 617
Manchester and District Junior Gas Association — Discussion of the Presidential Address 618
Examining Spent Gas Purification Masses . 619
Gas Bubbler for Gas Analysis 619

CORRESPONDENCE.

Benzol Extraction and Ill-Timed Letters to the Public Press. 620
Unalterable Air and Gas Adjustment . . . 620
Stripped Gas—Pressure and Unaccounted-for Gas 620
The Home Supply of Benzol 620

REGISTER OF PATENTS.

Converting an Engine into a Coal Gas Compressor—Murphy, S. J. 620
Controlling the Supply of Combustible Mixtures—Keith, J. & G., and Whatmough, W. A. 620
Distillation and Recovery of Ammonia—Wilton, G. 620
Scrubbers, Cleansers, and Coolers for Gas—Smith, D. J. 621
Applications for Patents 621

LEGAL INTELLIGENCE.

A Libel Action Withdrawn 621
Responsibility for Damage to Public Lamps. 621

MISCELLANEOUS NEWS.

Report of the Local Government Board . . 622
London County Council and Calorific Power and Inerts 622
Peat-Coke and Oil Syndicate, Ltd. . . . 622
Coal Shortage and Labour Troubles . . . 623
Cheltenham Gas Supply Threatened . . . 623
Nelson and Brierfield without Gas . . . 624

MISCELLANEOUS NEWS—(*continued*).

Burnley Gas-Works Extensions. 624
Science and Industry—An Address by Sir William S. M'Cormick. 624
Current Sales of Gas Products 625
Cannock Gas Company and the Council . . 627
Dublin Gas-Stealing Case 628
The Gas and Electricity Restrictions . . . 628
Stock Market Report 629

PARAGRAPHS.

Temporary Increase of Charges Act . . . 607
New Vice-Presidents of the B.C.G.A.—Tar as Fuel for Diesel Engines—New South Wales and Queensland Gas Institute—Bye-Products Works for Australia. 614
Relaxation of Priority for Government Work 626
Gas Oil and Petrol Prices Reduced—South Australian Gas Company—Street Lighting at Lichfield—Automatic Lamps in Birmingham—Shop-Window Lighting in Scotland—Bolton Gas Explosion—Gas Prices at Stockport—Street Lighting Changes at Halifax 627
Maximum Price at Penistone—The Coal Gas for Motors Competition—Gas Economy in London—Irish Gas-Workers' Strike—Athlone Gas Undertaking. 628
Drogheda Gas Price—Colonial Gas Association, Ltd.—Coal Shortage at Bangor (North Wales)—Meeting the Demand at Loughborough 629
"Pleco" Gas for Oldham—Coke-Oven Gas Supply at Sheffield 630

"JOURNAL" OFFICE TELEPHONE.

The "Journal" Office Telephone Number is "6857 Holborn."

WATER GAS

BLUE *AND* CARBURETTED.

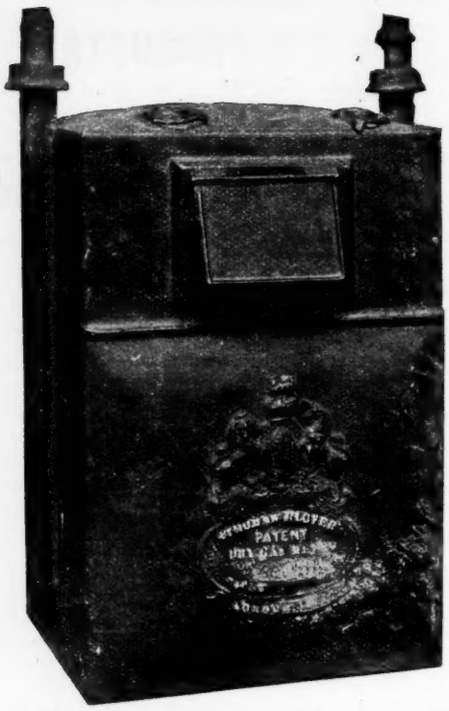
555 SETS OF HUMPHREYS-GLASGOW WATER GAS PLANT have been (and are being) installed, with a capacity of **368,400,000** cubic feet per diem. Including the work of their American Colleagues, **1427** Sets have been constructed with a total daily capacity of **1,146,300,000** cubic feet.

These Installations working twelve hours daily will produce the whole World's consumption of Water-Gas—about **150,000,000,000** *cubic feet per annum!*

HUMPHREYS & GLASGOW, Ltd.,
38, VICTORIA STREET, LONDON, S.W. 1.

BUREAU DE BRUXELLES: 209, Chaussée D'Ixelles.

GOOD SERVICE.



This "T.G." Meter was made and fixed in 1867. It was recently removed for test and found to be correct, after 51 years in ne position.

How do you arrive at Values?

Do you say "How much per Meter," or "What life can I expect per Meter"?

The "T.G." Meter costs only as much as the next best.

The "T.G." quality still stands out on top, as it did in 1844.

THOMAS GLOVER & CO., LTD.

(Original Makers—Established 1844),

Gothic Works, Angel Road, Edmonton, LONDON, N. 18.

London Showrooms: 25, Princes St., Oxford Circus, W. 1.

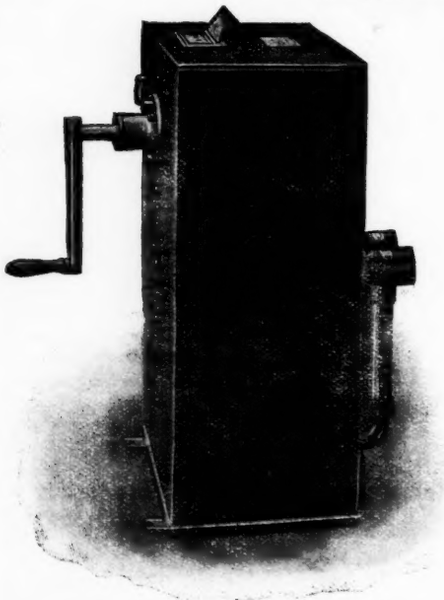
Gothic Works, King Edward Road, BIRMINGHAM; 18, Severn Street, Deansgate, MANCHESTER; Gothic Ironworks, FALKIRK; 82, Gordon Street, GLASGOW; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY.

PARKINSON'S

PATENT

Gas Filling Recorder

SPECIALLY CONSTRUCTED FOR



Prices on Application.

FILLING GAS BAGS FOR MOTORS QUICKLY.

SMALL IN SIZE. Dimensions, 3' 2" × 17" × 15". Fitted with 2½" Connections.

LARGE IN CAPACITY.

600 CUBIC FEET IN 10 MINUTES.

Officially Stamped as a Correct Measure.

W. PARKINSON & CO.,

(INCORPORATED IN PARKINSON AND W. & B. COWAN, LTD.

COTTAGE LANE, CITY ROAD, LONDON.	BELL BARN ROAD, BIRMINGHAM.	HILL STREET, BELFAST.
Telegrams: "INDEX, LONDON."	"GASMETERS B'HAM."	"PREPAYMENT, BELFAST."
Telephone Nos.: 7570 CITY.	2345 MIDLAND, B'HAM."	3374 BELFAST.

GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLIV., No. 2901.] TUESDAY, DECEMBER 17, 1918. [70TH YEAR.

EDITORIAL NOTES.

A Strong Organization of Gas Undertakings.

URGENT is the need for a strong organization of gas undertakings; and the gas undertakings have the power in their own hands to-day to create such a body. They have never before had a similar opportunity; but they have it now, and in a form which, if duty is done to the industry and to individual undertakings, will knit together the whole for prosecuting work of expansion, readjustment, and defence. This being so, we repeat the appeal made last week that the circulated invitation forms to become members of the National Gas Council, which will be an elected body controlled by gas undertakings, should be filled-up and returned without delay, so that powerful representation and authority may be brought into being by the time general activities are resumed after the Parliamentary Election and with the New Year. Succeeding the war, everything is in a state of flux. For the gas industry the position is compounded of good promise, heavy difficulties, and much anxiety; and the industry must lay its administrative, technical, and commercial heads together, and set its brains to work to see that, as order is restored from disorder, and as new constructive work is taken in hand, it has proper place and recognition, and the necessary powers to fill its rightful place. It is no easy task that is before the industry. Therefore, every gas undertaking that becomes a member of the new National Gas Council will be doing its part in seeing that the industry is adequately represented. It will have its vote in electing representatives for the executive body; a voice in instructing these representatives as to the views of the district undertakings; and both voice and vote in dealing with regional matters. The National Gas Council is the body with whom Government Departments will work in matters affecting the interests of the whole gas industry; therefore to be unattached to the Council will be a mistake in policy of any gas administration. Then do not let the membership invitation papers find their way into the waste-paper basket, or be put on one side and forgotten. There is no time like the present for filling them up, and returning them.

The Rationale of Continued Benzol Extraction.

COMMERCIAL success depends very largely upon the economy of production; and the economy of production is the aggregate of a number of contributory economies and efficiencies. In the gas industry, we shall more than ever in the competitive future have to bring down the net cost per unit of gas production to the lowest possible point; and this in face of higher costs of manufacturing materials and of plants and goods, as well as of labour. There is not an item in the resources of the gas industry that it can afford to cast aside as useless. Benzol is one of these items; and benzol supplies a topic which is taking a prominent place in our industrial polemics, owing to the somewhat strange division of opinion that exists in the industry as to whether or not benzol extraction plants ought to be continued in operation. This division of opinion shows that there are some who are irresolute, and have not gauged the question or the position with any really true precision. Those (with an exception) who have the largest experience of benzol recovery are those who have no desire at all to abandon it; while those who cannot make up their minds on the subject are generally those with smaller experience, or those who want some assurance that benzol possesses merits that will positively ensure for it the necessary markets.

One who has during the war had a large experience of the work of benzol recovery by gas-works, and who has made an extended investigation of the merits of benzol as a motor spirit, is Mr. S. E. Whitehead, B.Sc., who had a long leave of absence from the Southport Gas-Works to take the position of assistant to Mr. W. Doig Gibb in the technical supervision of the Benzol Section of the Explosives Supply Department of the Ministry of Munitions. In this position, Mr. Whitehead has never lost touch with the gas industry. Now, however, that his work is practically finished for the Ministry, he will ere long be returning to Southport. But, before he does so, we welcome from him an article which, we are confident, will be of considerable persuasive value in relation to the question of the recovery of benzol. It may be accepted as a good axiom that we ought not to allow anything to be burned as gas which, while not materially depreciating it, is of greater value elsewhere; and Mr. Whitehead shows in his article that there is about fifteen to twenty times the value in benzol recovered as a liquid that there is in it burned as a vapour. Inherent value of this kind should not be allowed to be wasted when avoidable—in fact, in the interests of the country, it ought almost to be forbidden. This supplies a good starting-point in the consideration of the question as to future policy in this regard. The recovery of the liquid having such potentiality above the use to which it was formerly put, by letting it remain in the gas merely for burning purposes, is a means of expanding the business of the gas industry; and as diversity of business—particularly when the diversity is obtained from the same raw material and processes—is a factor in stability, there is here something of an intrinsic value beyond the direct revenue and the profit derivable from the benzol. It has so often been shown that the oil washing of gas only takes from it some 5 p.ct. or so of its calorific value, that it is absurd to talk about any real disadvantage to the gas consumer; or to illogically plead that, for the gas consumers' sake, the benzol should be retained while it is of greater use to the country for other purposes. As a matter of fact, those who have read with attention the report that the Gas Investigation Committee presented at the last meeting of the Institution of Gas Engineers will have seen that one of its lessons is that the retention of benzol in the gas is not by any means necessary to the efficiency of the latter.

Before war conditions arose, the demand for benzol was growing; but the gas industry's technical men did not know then all that wartime experience has taught them. The reason for the demand was that the use of petrol was expanding in such a way as to outstrip supply, and consequently petrol prices were ascending. If this was the condition before the war, how much more will it be the condition as soon as there is full car-running liberty and no restrictions on the purchase of motor spirit, with motor-car output going on apace. Mr. Whitehead produces evidence in his article which proves absolutely beyond doubt that benzol is more economical in use for car purposes than petrol, that it is more powerful, and consequently that there is greater mileage in it per gallon. This is the accumulated experience of upwards of a decade; for as far back as 1907, the report of the Fuel Committee appointed by the Motor Union was very favourable to benzol. All this is good and encouraging reading. But it would be a fatal blunder to consider that all that is designated benzol is suitable for motor purposes. Quality is necessary. The benzol must have characteristics which allow of ease in starting, there must be absence of objectionable odour, and no liability to form deposits in cylinders and valve passages. There is no question that the difficulties in regard to impurities can be easily overcome. These are matters that are discussed

in our contributor's article; and they are matters that bear upon the question of a standard specification for benzol. It is quite obvious that Mr. Whitehead is, on the ground that it is essential, fully in sympathy with the proposal of the newly-formed National Benzol Association to institute research with a view to producing a proper prescription for standard benzol to serve as motor spirit.

While on this subject, there is a point which should be noticed regarding the recent announcement of the Board of Trade [*ante*, p. 580] that, owing to the considerable quantities of benzol now available as motor fuel, special supplementary licences will after Jan. 1 be issued for the purchase of benzol only. This should, if properly appreciated, at once give a good spurt to the use of benzol. But in connection with these supplementary licences, there seems to be the chance of misinterpretation owing to the manner of expression in one phrase. It says: "These special licences "will authorize the purchase of a quantity of benzol exceed- "ing by 50 p.ct. the quantity of petrol which would have "been allocated on an ordinary motor spirit licence." It would be a pity if this statement were to give a wrong impression, by leading motorists to suppose that it requires 50 p.ct. more benzol to do the same work as a given quantity of petrol. As a matter of fact, a motor car will with benzol only require about 85 p.ct of the quantity of petrol that would be needed for a given running; so that the 50 p.ct. is a concession over petrol of a percentage far in excess of the 50 p.ct., power for power.

However, underlying the matters dealt with in the article before us is the fact that there is no discernible ground why recovery of benzol by gas-works should cease. Plants are in existence; and experience, through compulsory need, has been gained by the industry. There have been difficulties in some cases; in others operation has proceeded smoothly. There is no reason why, here and there, there should be difficulties and contrary experience elsewhere. In some instances where there have been difficulties, managers have come to the conclusion that benzol extraction does not pay. But on the other hand, money we know is being made from benzol in several works; and revenue from any source is something the gas industry cannot lightly reject in these or future times. There is, so far as the signs enable a forecast, a big future for benzol. Therefore, engineers are counselled to keep extraction plants running, and not let subsequent development rise up and accuse of shortsightedness in these days when everything is urging the industry to make the best use of its opportunities and experience.

L.C.C. and Calorific Value and Inerts.

THE London County Council are again moving. At every turn, they try to check the gas companies, even though they may be doing them a serious injustice. They were head and front in the opposition to justice being done to gas capital, on the false ground that an injustice would thereby be done to the consumers. They would not, or could not, realize that the war had completely shattered the terms on which capital was invested in gas supply. They would not, or could not, see that a dividend of £1 15s. or £2 per annum was not a fair thing, nor that the suggestion that it was was anything but creditable to the intelligence, dignity, and just action of such a body as the Council. They pursued the gas companies in this matter through Parliament; and now hostilities have ceased and the companies have the option of continuing or reducing the extraction of benzol from their gas, the Public Control Committee of the Council are considering the question of further attacking them—again in the name of the consumers—to get restored pre-war conditions in regard to the heating quality of the gas supplied. The companies are yet far from being out of the wood in respect of coal supplies and other conditions, the wrong that was done to gas capital will long continue, and costs show little sign of abating. Anything that is done now to alter existing conditions will add to the cost of production, which must be passed on to the consumer. It is hardly likely the Board of Trade and the Coal Controller will consent to any change which will necessitate an increase in the coal supply to the companies.

The Public Control Committee realize that the washing of gas for the extraction of benzol has but a small percentage effect upon the calorific value; and they bring the gas supplies north and south of the Thames into comparison, recognizing that there has been tar-washing south and oil-washing north. But they do not specifically point out that the Gas Light and Coke Company and the Commercial Gas Company have been helping to relieve the coal situation by using water gas, while the South Metropolitan Gas Company were unable to do so through lack of water gas plant, and so have produced all their gas from coal. Even so, the worst that the Committee can attribute to the gas-supply north of the Thames is that it fell in calorific power to an average of 490 B.Th.U. in the first half of this year, and to 470 B.Th.U. in the period from June to October. It seems, too, that the Council have had special examination continuously made of the gas for inert content; and that north of the Thames the gas compares unfavourably in this respect with the south. There is on the part of the Committee a little uncertainty regarding this matter. While declaring that they are satisfied the power of the gas was altered by these conditions, they admit that it could be "hardly urged "that any particular deficiency was caused thereby." Probably the Committee, or their advisers, have been studying the recently issued report of the Joint Gas Investigation Committee of the Institution of Gas Engineers and the Leeds University, and the results of their research in relation to the effects of inerts upon efficiency. As it happens, inerts are not subject to statutory control, but calorific value is. What the Public Control Committee's report shows is that the two Companies north of the Thames have, considering oil washing, the use of water gas, and the position of oil, dropped surprisingly little below the 500 B.Th.U. now ordinarily allowed under the general legislation affecting calorific power, and have kept well above the 450 B.Th.U. permitted latterly to companies who have been producing benzol for national purposes and using mixed gas.

However, we see that the Public Control Committee are considering what steps can be taken, consistent with national interests, to secure a return to pre-war conditions as regards the heating value of the gas. We welcome the reference to "national interests," because motor spirit and coal supplies are important factors just now in the national interests; and any increase in the companies' revenue and reduced coal costs are also in the interests of the gas consumers. There is considerable evidence now available that, with present-day gas appliances, consumers are not injured in their pockets (having regard to manufacturing, distribution, and other costs) by such differences of calorific power as are quoted in the report, which is reproduced in our news columns.

Demobilization and Available Employment.

DEMOBILIZATION has within the last few days assumed a new phase which will be welcomed by employers generally—this since the article was written which appears in succeeding columns, and which uncovers to view one part of the valuable work which the Dilution Section of the Labour Supply Department of the Ministry of Munitions has had in hand. To assist industry, the Government are now opening wider the doors to demobilization—although keeping fairly close to the principles which they had already adopted and promulgated. These principles were that the return of men to civil life should, as far as military requirements rendered possible, first include those who have definite employment awaiting them, and that among these the highest priority should be given to pivotal men. But employers do not seem to be pushing and jostling each other in their eagerness to get pivotal men back again. Admittedly the mechanism prepared for doing so by the Government Departments concerned is anything but simple, and means delay. But the fact is that the middle of last week, although the Demobilization Department had made arrangements for the return of 120,000 pivotal men, the names of only 2500 had been received. The complex mechanism which employers had to put into operation would not have deterred those who were desirous of losing no time in securing valued men; and so it seems likely that many industries are for the time being unprepared to receive an extensive number of men until works and factories are again equipped and ready with the necessary materials to proceed with production. So many industries have been disorganized through the war that it is impossible to bring about any sudden conversion, and particularly in the matter of the supply and repair of plant and the provision of raw materials. Even did shipping, berthing accommodation, railways, and the military situation allow, to dump our fighting forces into the country would only quickly exhaust the present absorbing power of industry, and result in a large army of unemployed parading

the streets. In the interests of the country, of the men, and of industry, this state would be infinitely more deplorable than present conditions. Dissatisfaction would be rampant, and maybe worse than dissatisfaction would happen.

Now, however, the Government have found it possible to release men more rapidly than was at first anticipated; and therefore it is desired to accelerate the process of identifying the men in the forces who have definite work awaiting them. This is the proper and prudent starting-point. The scheme that has been prepared is not in place of, but supplementary to, the former process. The gas industry could at once absorb a number of their former skilled works' men, as well as many district men; and they could absorb still more if gas rationing, reduced coal supplies, and materials shortage were not here as delimiting and hampering factors to their operations. But we are not convinced that, even under the new scheme, the release of men is going to be effected in time measurable by days; it is more likely that—simplified procedure notwithstanding—weeks will pass before much-wanted men are at their old posts. We shall then be looking forward to spring time, and to plans for taking-up repair and reconstruction arrears on the works, and repairs and new work on the district and on the consumers' premises. Therefore, the correct plan will be to take the necessary steps to secure not only those men who could if available be restored to their former jobs immediately, but those men who will be wanted before many weeks are over, when winter's pressure slackens, to engage upon work which has, through the force of circumstances, had to be put aside the last few years.

Under the new scheme, the formalities are not by any means imposing; and they need not cause vexation, as some system of transfer from military to civil life must be followed. And the new system appears about as simple as one could possibly be. All that employers have to do (following the instructions and giving the details published in the daily papers towards the end of last week) is to get into communication with those of their men who were in their employ before Aug. 4, 1914, and definitely offer each of them employment. The offer will be accepted by the commanding officer as evidence that employment awaits the man; and he will then be registered for demobilization. This scheme is in addition to the selection of pivotal men now in progress, the use of the civil employment form which is being filled up by members of the forces, and the post-cards and other forms which employers have been invited to fill up, but compliance with which invitation is not generally being marked with any great fervour. Which method is going to be more effective in the matter of time is not said; but the new plan is the simpler. If allowed to make a shrewd guess, we should say that it is substantial testimony to the failure of its predecessor. People have got very tired of the forms and processes of bureaucracy. They would be glad if the inventors of all such things could be sent away, and never be heard of in the business world again. They could be given the "O.B.E.," or anything else within reason, if only they were finally deprived of the power to intervene in business life with their monstrosities. The inefficiency of a large number of these officials has, through unnecessary interference, been productive of a large amount of inefficiency in industries and commerce.

The Tar Agreement Period.

We publish to-day the final draft of the agreement arrived at by the combined Committee of Tar Producers and Distillers; and it may be assumed from the tone of the circular-letter which accompanies it, and the attempt to compromise matters as to the term of an agreement, that the scheme has not been accepted with anything like general favour. The ten years' agreement was an obstacle; and in regard to it it is patent that the distillers still do not want to give away more than they can help in effectually binding the gas undertakings that accept the profit-sharing conditions. The period of the first agreement has been reduced from ten years to five. But mark this! it is proposed that, at the end of the third year, a further agreement for a period of ten years following the expiration of the five years, shall be brought up for consideration and decision. Is it necessary to have two years out of the five for consideration and discussion, or are the distillers anxious to obtain a decision as early as possible, so that the undertakings shall be chained-up, upon an experience of three years, for a period which in the total will be fifteen years? Gas undertakings in their own interests will ascertain precisely what clause 7 means before entering into the first agreement, as there may be not a few who will be willing to make an agreement for five years who will not desire to be bound by any decision come to at the end of the first three years.

Salaries in the Gas Industry.

On several occasions during the past year, the Technical Press have published letters regarding inadequate salaries paid to many officers and members of staff in the gas industry. The question was discussed at a recent meeting of the Midland Association of Gas Engineers and Managers, when it was decided to approach the other District Associations. We understand that favourable replies have in most cases been received; and, as a consequence, a conference on the subject will be held early in the New Year.

More Oil and Lower Cost.

The oil position at the rear part of war time is a curious one, when account is taken of the difficulty there has been in securing supplies of gas oil, and the control and regulations attaching to its use. Information to hand shows that, in the eleven months of 1918, the imports of petroleum products into the United Kingdom amounted to 1199 million gallons, as compared with 726 million gallons during the corresponding period of 1917, and 426 millions for the like period of 1916. Of the total, gas oil contributed 35½ million gallons, as compared with 29 millions in the eleven months of 1917, and 53 millions in 1916. It is easy to understand now the somewhat lukewarm interest the Government took in the criticisms levelled against them over their liquid fuel policy when we learn that the eleven months liquid fuel imports amounted to 765 million gallons, as against 373 millions in 1917, and 20 millions in 1916. Exports of fuel and gas oils by the United States in the first eight months of the present year amounted to 819,608,709 gallons. The controlled price of gas oil has been reduced as from yesterday by 7½d. per gallon; fuel oil, by £4 per ton; and petrol, by 3½d. per gallon. Relaxation has set in with good material result.

Coal Delivery Priority.

The "Iron and Coal Trades Review" repeats in its last issue the order of priority for coal deliveries which the Coal Controller originally circulated among collieries. Our contemporary is behind the times; and the paragraph in last week's issue of the JOURNAL ought to have suggested to it that there was a point here worth inquiring into, in view of the fact that we printed on the authority of Mr. W. E. Price, the Hon. Secretary of the Institution of Gas Engineers, a different order of priority. We then asked who was right—Mr. Price or the "Iron and Coal Trades Review" and "A Sufferer" whose letter appeared in our "Correspondence" columns. Another correspondent says that all three were right; and he explains that the order placing gas and electricity works seventh on the list was issued about Nov. 22; and some five days later the order was withdrawn, and another made which placed gas and electricity undertakings third on the list. So the mystery is cleared up. It is only fair to the "Iron and Coal Trades Review" to say that, though it did not appear to know of the revision last week, it is aware that a movement had been made to secure a revision so far as gas coals were concerned. It says: "In the reduction in deliveries that will have to be made from pits where the coal is usable for both gas and house purposes, we understand collieries have made representations to the Coal Controller's Department in respect to this question, with a view to having the order modified, as collieries fully recognize that, if these very definite orders were carried out in their entirety, the supplies of gas coal available will be so restricted as to result in a very serious position." A change has been made; so that now we hope all will be well.

Temporary Increase of Charges Act.—The Board of Trade have made further Orders under the Statutory Undertakings (Temporary Increase of Charges) Act in favour of the Bishops Stortford, Harlow, and Epping Gas and Electricity Company, the Tipperary Gas Company, Ltd., and the Burnham Gas Company, Ltd. Applications have also been made to the Board by the Westgate-on-Sea and Birchington Gas Company, the Lowestoft Water and Gas Company, the Great Yarmouth Water-Works Company, and the Conisborough Gas Company, Ltd.

COAL AND OIL SUPPLIES—IMPORTANT NOTICE.

THE Controller of Coal Mines has requested the National Gas Council to draw the attention of gas undertakings to the urgent necessity during the next four to six weeks of conserving to the utmost possible extent their supplies of coal, as it will be most difficult to maintain deliveries during this period. The Controller is making an appeal to all those undertakings that have carburetted water gas plant to utilize this mode of manufacture as much as possible, for which purpose the price of gas-oil has been reduced.

NOTIFICATION OF LIGHTING CONCESSION.

THE National Gas Council are informed that, while the Home Office Order respecting advertisement lights (which prohibits the use of outside lights) has not been formally suspended, the Board have requested the police not the enforce the Order in the case of lights outside shop fronts which are used for illuminating goods in the window, if there are no inside lights serving this purpose. No increase, however, will be granted in the lighting rations. This rule applies throughout the kingdom.

PERSONAL.

Mr. JOHN MACDONALD, has been appointed Manager of the Gas-Works at Kilmalcolm, Renfrewshire. He has been two years Manager at Oban.

Miss Gladys M. Ingram, only daughter of Mr. S. J. INGRAM, of Truro, a few days ago sailed from Liverpool for China, where she is to marry the Rev. Stanley H. Dixon, late of Truro, who is now engaged in missionary work out there.

Mr. T. B. ARMITAGE, a District Inspector of the Aldershot Gas, Water, and District Lighting Company, has been appointed Assistant Outdoor Superintendent to the Swansea Gas Light Company. Mr. P. OLDROYD has been promoted to the position of District Inspector at Aldershot.

The Droitwich Corporation, after interviewing five candidates from among over forty applications, last Wednesday appointed Mr. WILLIAM H. WISE Manager of their gas undertaking, in succession to Mr. REGINALD THOMAS, who has resigned through ill-health. The output of the works is just over 30 million c.ft. per annum; and the salary has been fixed at £250 a year, with house, fuel, and light. Mr. Wise has been seven years at Tipton, for four of which he has occupied the position of Assistant Manager. He will take up his new duties early next month.

Captain H. E. TEMPLE, F.C.S., late Assistant Engineer to the Christchurch (*N.Z.*) Gas Light and Coke Company, and formerly of the Birmingham Corporation Gas Department, has just been honoured by the King of Belgium with the Cross of Chevalier of the Order of the Crown, for special services in connection with high explosives. Captain Temple has devised a process for treating high explosives, which has been adopted by the British Government, and for which he has received a special award. It is his intention to remain in England, and to devote his attention to improved methods of gas manufacture.

Mr. IAN ALASTAIR MACKENZIE, who was assistant to Mr. Richmond, of Heckmondwike, and afterwards Secretary and Manager of the Whitewell Gas Company, has been appointed by the Corporation of Stoke-on-Trent as assistant under Mr. Alex. M'Kay, the Chief Engineer in charge of their Fenton Gas-Works. Mr. Mackenzie, who was very severely wounded two years ago in France, and in hospital for fully eighteen months, was discharged from the Army some months since. He has only the partial use of his left arm; and his appointment under such circumstances redounds to the honour of the Gas Committee and Engineer of Stoke-on-Trent. Mr. Mackenzie is the elder son of Mr. Andrew Mackenzie, of Messrs. Alder and Mackay, Ltd.

The Hereford Corporation are placing in the gas-works a gun-metal tablet to the memory of their late gallant Engineer and Manager, Lieutenant CHARLES V. TOWNSEND, who was killed in action in France in March, 1916. He was appointed to his position at Hereford in December, 1913, and succeeded his brother, Mr. W. W. Townsend. Early in September, 1914, Lieutenant Townsend joined the Grenadier Guards as a private, and subsequently obtained a Commission, and was transferred to the 7th (Service) Battalion of the K.S.L.I. In France he accomplished much good work, with conspicuous bravery and under arduous conditions, and earned both the praise of his fellow officers and the love of his men. For his meritorious conduct and devotion to duty he was mentioned in despatches. After his death, his Commanding Officer, in a letter of praise and sympathy, said: "He was one of the bravest men I have ever met."

Last Tuesday evening, Mr. FREDERICK A. PRICE, the Superintendent of the Manchester Corporation Gas Department, on behalf of the officials, presented a solid silver rose-bowl and two silver vases to the daughter of Alderman WILLIAM KAY (the Chairman of the Gas Committee), on the occasion of her marriage to Captain Cyril Benton, of the Manchester Regiment. Captain Benton was unable to attend, owing to being on active service. In making the presentation, Mr. Price expressed the feelings of the officials when he said they shared the joys and the sorrows of Alderman and Mrs. Kay. In the present instance, it was a happy event; and the best wishes of the officials accompanied the gifts to Captain and Mrs. Benton. Incidentally, Mr. Price mentioned many ways in which the officials of the department showed their *esprit de corps* by the establishment of various funds. Mrs. Benton gracefully acknowledged the kindness which prompted the action of the officials.

The "Co-Partners' Magazine of the Gas Light and Coke Company" records a presentation on the 19th ult., to Mr. T. S. LACEY, the late Resident Engineer at Beckton, of a sideboard, as a memento of the personal regard of the engineers and other officers of the Company. Mr. T. Goulden (the Chief Engineer) occupied the chair, and asked Mr. Lacey's acceptance of the gift, which he said would remind him of his numerous friends yet in active employment. He wished him many happy years. Mr. Lacey, in returning thanks, remarked that his whole active life had been spent with the Company, which was, he thought, a characteristic feature of the service, and one that should be cherished. He had acutely felt the severance from the material, as well as from the personal, associations of his life's work. After commending the idea of co-partnership as an embodiment of this principle of solidarity of interest, he testified to the honourable conduct of the Company's employees as a whole, and claimed for himself to have left a tradition of fair treatment to those under his direction or influence.

Proper Combustion Methods.

In the course of an article urging the saving of heat units, Mr. H. E. Gilbert, writing in the Chicago "Gas Record," makes some suggestions as to proper combustion methods. He points out that if proper combustion is obtained by means of a system, or of a burner, the ultimate stage has been reached in the possible amount of heat to be secured for a given quantity of the fuel employed, this being dependent on the available British thermal units. With coal at 13,000 B.Th.U. per pound, oil at 18,000 B.Th.U. per pound, producer gas at 150 to 190 B.Th.U. per cubic foot, blue gas at 300 B.Th.U., bye-product gas from 500 to 650 B.Th.U., and natural gas up to 1000 B.Th.U. per cubic foot, flame temperatures will be in direct ratio to the British thermal unit value of the fuel. The maximum is reached with fuel oil containing a high percentage of carbon with a low percentage of hydrogen. These two elements and their relative proportions are the basis of British thermal unit or calorific values. The highest British thermal unit values are found in the combination of acetylene with pure oxygen. With proper combustion established, the application of heat to a purpose is the second important essential of fuel conservation. With a knowledge of the fact that flame temperatures with proper combustion are in direct ratio to the calorific value of the fuel, one can intelligently consider the subject of the application of heat to a purpose; and since in average practice the higher temperatures are the most difficult to obtain with any fuel, it follows that the greatest percentage of possible waste will occur in the attainment of high heats. Matters of the first importance are the selection of a proper combustion system for any fuel, and of a suitable furnace design; and the selection of the right fuel for a given purpose from the standpoint of possible maximum efficiency in its use, is equally important.

Inclined Chamber Ovens.

Describing, at the last meeting of the Michigan Gas Association, an installation of inclined chamber ovens which has been in operation for about two years at the works of the Calhoun Gas Company, at Battle Creek, U.S.A., Mr. F. W. Seymour, the General Manager, stated his conviction that bulk carbonization has come to stay. The original equipment contained a pulverizer, as well as a crusher, for the preparation of the coal for carbonizing; but it was soon found that the pulverized coal had no advantage over the ¾-in. crushed coal (which the crusher alone provided), either in coke quality or in other results in the battery. From a labour point of view, the tasks are not nearly so arduous as those which stokers have to perform in retort plants. The rated capacity of the plant described, divided by the number of men per 24 hours from coal-pile to coke-towers, not including foremen, is 83,000 c.ft. per man. The calorific power of the gas from the ovens, when operating on twelve-hour charges, under the same pressure regulations, seems to be practically identical with that from the ordinary retort-house. Superheating and cracking of the gas are noticeably absent, as indicated by the scurfing record. Very rarely is it necessary to decarbonize an oven on account of excessive carbon formation. One of the innovations on this installation was the use of a dry-seal collecting main. The bridge-pipes are fitted with a mushroom-valve, which shuts the gas off from the collecting-main during charging. Liquor is flushed through the bottom of the main, to prevent the collection of pitch. The working results of this installation have led the Company to construct four further settings of twelve chambers of 3 tons capacity per chamber. With these new ovens, the off-take pipes are 10-in. in diameter, and lead with a very short stand-pipe to a hydraulic main. This is specially designed so that mushroom valves can be readily added, and the main operated unsealed or as a dry collecting main. A conveyor runs through the main on the bottom, to act as a tar-drag.

THE TAR SALE AND PURCHASE SCHEME.

Period of Agreement—Final Draft of Proposals.

ACCORDING to a circular-letter which has been sent out by the National Gas Council, the scheme for the sale and purchase of tar arrived at by a Joint Committee of Tar Producers and Distillers, has now assumed definite shape.

It appears that the Committee have met and heard the report of Mr. H. E. Ibbs as to the impressions he obtained during his visits to the various centres; and, as a result, it was decided to adhere to the principle upon which the scheme was based, but that certain details could with advantage be amended. The principal amendment seems to be one which will commend itself to a large number of readers—that is to say, the period of an agreement has now been reduced from ten to five years. But it may be doubted whether there will be many undertakings which will agree to the suggestion contained in the proviso that at the end of the third year a further agreement for a period of ten years following the expiration of the five years' agreement shall be brought up for consideration and decision.

Gas undertakings have been asked to answer the following questions:

1.—Would you be prepared to recommend your undertaking to accept the scheme?

2.—If not, would it be because of your disagreement with (*a*) the principle or (*b*) the details?

3.—In the latter case, please give briefly your objections.

4.—Does the suggested method of dealing with undertakings dehydrating tar meet with your approval?

In the letter, the Committee express the hope that, with the alteration in the period, gas undertakings will be able to accept the recommendation with regard to the further period mentioned of ten years. They add that it is very desirable that a scheme should be adopted, as the need for combination in some form or other is pressing, and the only alternative is for matters to remain in their present chaotic and unsatisfactory state.

Below is the draft scheme as it now stands; the alterations being printed in italics. Accompanying the text of the scheme is a tabular scale showing the net return for tar to distillers and producers at given prices; but this scale we are not giving.

DRAFT SCHEME FOR THE PURCHASE OF TAR BY DISTILLERS FROM GAS UNDERTAKINGS.

PRODUCERS AND DISTILLERS.

1.—The return per gallon of tar derived by the distillers from the make and sale of all products present in recoverable amounts in tar, and which have been obtained from tar delivered by the gas undertakings (such as crude naphtha and light oils or commercial and pure benzol and commercial and pure toluol, solvent naphthas, heavy naphthas, creosote of all grades, naphthalene—crude, whizzed or pressed—anthracene oil, 40 p.ct. "A" anthracene, crude carbolic, crude cresylic, refined 97 p.ct. cresylic, pyridine bases, prepared tar—including dehydrated tar and mixtures of pitch and creosote), pitch, after deducting working expenses, to be the price per gallon, of which proportions are to be paid to the distillers and producers on the following scale:

If the net return at distillers' works is equivalent to:

2·0d. or under per gallon . . .	16·5 p.ct. to distillers. 83·5 p.ct. to producers.
2·1d. per gallon	16·7 p.ct. to distillers. 83·3 p.ct. to producers.
2·2d. per gallon	16·9 p.ct. to distillers. 83·1 p.ct. to producers.

and so on by additions of 0·2 p.ct. in the distillers' favour for every extra 0·1 of a penny per gallon, *until a net return of 4d. is reached, after which figure the percentages of 20·5 to distillers and 79·5 to producers remain constant.*

[It is understood that the scope of the products is not in any way limited by the above-mentioned list; and should any further products of commercial value be derived by the distillers during the period this scheme is in operation, the participation by the producers in any profits obtained therefrom is to be a matter of mutual agreement.]

2.—Working expenses are not to include such items as directors' fees, management fees other than those required for the conduct of the business, rent of works, or depreciation of buildings and plant, but are to include ordinary wear and tear, and renewals in so far as they do not constitute extensions or improvements. Stocks to be taken into account at current values.

3.—No water in tar in excess of 5 p.ct. to be paid for.

4.—The cost of the conveyance of the tar (excluding hire of railway tanks, barges, use of barrels, &c.) to the nearest *existing* distiller to be at the expense of the individual producer.

5.—All accounts to be subject to such audit as shall be deemed necessary by the producers.

Payments for tar to be made on account during each month for the previous month's deliveries, at a price to be agreed upon from time to time by the respective parties.

Complete accounts to be made up yearly to June 30, and a settlement (subject to audit) to be made within two months after the end of such period.

6.—The distillers to be given a free hand with regard to the make of products, but to act in conjunction with the producers as regards the sale in such manner as shall be mutually agreed upon.

7.—The first agreement to be for a period of *five* years without revision during its term. *But at the end of the third year a further agreement for a period of ten years following the expiration of the five years' agreement to be brought up for consideration and decision.*

NOTE.—The above scheme contemplates combinations in some form or other between the tar producers on the one hand and the tar distillers on the other. It also contemplates co-operation as to the selling of the products between the above-mentioned tar producers and tar distillers and those gas undertakings that are already distilling tar.

PRODUCERS.

In the event of the producers and the distillers agreeing to the scheme, it is suggested that the total proportion payable to the producers be divided up (by the producers) according to the value of the tars delivered, in the following manner:

(1) For the purposes of valuation, makes of 50,000 gallons per annum or over to be analyzed by an independent analyst. All annual makes falling below this quantity to be assumed as being of the grade of the average of the six best makes.

(2) Revision of an analysis may be called for by either party at not more frequent intervals than six months, and with one month's notice.

(3) The amount available for distribution among the producers to be divided according to the quantity of tar supplied and the value shown on analysis. For this purpose a simple schedule to be agreed upon of certain fixed products with standard prices which may be varied, if necessary, at the end of each six months. The average value of all analyses to be then ascertained, and each producer's share to be in accordance with the valuation of his tar compared with such average.

Example.

Valuation of tests (test to be of not less than 100 gallons, and to include a penalty for water content, &c.).

		Quantity Delivered.
A.	2·44d. per gallon	100,000 gallons.
B.	2·50d. ,, ...	200,000 ,,
C.	2·43d. ,, ...	400,000 ,,
D.	2·52d. ,, ...	500,000 ,,
Average	2·48d.	

Say, producers' proportion is £15,000 for distribution, or 3d. per gallon.

A. $\frac{244}{248} \times \frac{3}{1} \times \frac{100,000}{1}$ = £1,230, or 2·95d. per gallon.

B. $\frac{250}{248} \times \frac{3}{1} \times \frac{200,000}{1}$ = £2,520 ,, 3·02d. ,,

C. $\frac{243}{248} \times \frac{3}{1} \times \frac{400,000}{1}$ = £4,899 ,, 2·94d. ,,

D. $\frac{252}{248} \times \frac{3}{1} \times \frac{500,000}{1}$ = £6,351 ,, 3·05d. ,,

£15,000

NOTE—The schedule on which the tests would be valued could be decided upon by a small Committee acting on behalf of the producers.

TAR DEHYDRATION.

All refined tar (dehydrated or otherwise), so far as production and sales are concerned, shall be under the control of the governing body of the larger scheme, subject, however, to the following arrangement, which provides that each undertaking shall benefit according to the results experienced by it during an agreed past period:

1.—The quantity of such tar disposed of during 1917 or 1918 (at producer's option), together with the price obtained in the year selected, shall, in the case of any undertaking, form its standard for accountancy purposes, and each undertaking shall be entitled to produce up to its standard quantity.

2.—Any sum realized over and above the standard, by reason of higher prices, shall be for the common benefit of all parties to the larger scheme.

3.—Should any undertaking be asked to produce a larger quantity of refined tar than its standard, the extra expenses of so doing will be refunded to the undertaking. The quantity of refined tar so taken will be paid for as crude tar, as provided by the larger scheme, but delivery taken on rail at, or nearest, dehydrator's works instead of at the distiller's works.

4.—Should the price realized for crude tar at distiller's works over any accounting period exceed the standard price for refined tar in any particular case, then the price realized for crude tar, together with the agreed expenses of refining, shall be substituted for the standard price in that particular case.

5.—Light oils directly resulting from the refining of tar by dehydration shall be purchased by the distiller on schedules of products and values to be decided upon from time to time.

6.—Any special circumstance that may arise in connection with the above arrrangement may be dealt with according to its merits by the governing body.

The Council of the Society of Engineers have awarded the President's Gold Medal to Mr. T. Roland Wollaston, of Manchester, for his paper on "A Survey of the Power Bye-Product Problem."

The "Distribution of Heat, Light, and Motive Power by Gas and Electricity" will be the title of the paper to be read before the Royal Society of Arts, early in the new year, by Sir Dugald Clerk, K.B.E., D.Sc., F.R.S

GAS ACTS FOR 1918.

[FIRST ARTICLE.]

THE number of Gas Acts that have to be noticed for the final session of the now expired Parliament has shrunk considerably from the number of Bills that were promoted. The explanation is the withdrawals, owing to the passing of a general measure to deal with the question of financial relief. In reviewing the Acts, we shall only, as far as possible, note the changes that have been made during the progress of the measures through Parliament. The Bills were reviewed in a series of articles appearing in the "JOURNAL" from Jan. 1 to Feb. 5; and from these articles the information can be obtained as to those matters that have undergone no change.

In the Aldershot Gas, Water, and District Lighting Act, it is seen that the extra price the Company may charge for gas in the extended area of supply has been altered from 1s. 7d. to 1s. 6d., and for a period of seven years it is never to be less than 1s. in excess of the price charged in the parish of Aldershot. The electrical powers conferred upon the Company in 1909 in the parishes of Ash and Seale have been revived. If the electricity undertaking of the Company is purchased within seven years of the passing of the Act otherwise than by agreement, the Company are not to be entitled to make any claim in respect of the powers conferred by the section of the Act of which the marginal note is "Power to Use Certain Lands for Gas-Works, &c., and Generation of Electrical Energy," or to bring into account any sums expended by them under the said powers exceeding the amount of the capital expenditure properly incurred pursuant to these powers, together with interest at the rate of 6 p.ct. per annum on the amount up to the date of purchase. Power is given to the Company to transmit to the electricity station at their Ash Road gas-works electrical energy generated at any of their generating stations outside the parish of Aldershot; and they may use any electrical energy so conveyed for any purpose in or upon the said electricity station, and for distribution or supply therefrom to any sub-station or other works of the Company, and to the premises of any consumer outside Aldershot. The powers sought are conferred in respect of the supply of gas for traction purposes. Within the limits of supply added by the Company's Act of 1901, the price of gas supplied by meter is never to be more than 6d. in excess of the price for the time being charged in Aldershot; and as from the expiration of one year from the termination of the war, the excess is not to exceed 3d. Protecting clauses have been granted to the Berkshire County Council, the Surrey County Council, and the Postmaster-General. A co-partnership scheme is provided for. The additional capital has been altered from £300,000 to £150,000. The other clauses are as mentioned in the review of the Bill on Jan. 1. [*Parliamentary Agents: Messrs. Dyson & Co.*]

The Alliance and Dublin and the Basingstoke Bills were both withdrawn.

The Brentford Gas Company's Bill has been passed by the House of Commons, and is waiting second reading in the House of Lords. It has been suspended for completing its progress in the next session. When we are in the position to review the measure, it will be found that it has been shorn of certain of the powers that were sought in the original Bill. [*Parliamentary Agent: Mr. John Kennedy.*]

The British Gas Light Company, Limited, are proposing an extension of the works at Norwich. The new capital powers have been changed from the terms in the measure as promoted. Further capital authorization is now allowed to the amount of £200,000, in addition to the £425,000 already authorized to be expended. Of the £200,000, £100,000 and no more may be expended out of the capital stock; and there may be borrowed on mortgage in respect of this further capital sums not exceeding in the whole £100,000. The dividend on the additional capital is limited to 7 p.ct., whether the capital is issued as ordinary or preference, and the rate of interest on sums borrowed on mortgage is not to exceed 6 p.ct. per annum. Without the consent of the Corporation, the Company are not to expend any of the capital authorized by the Act after the expiration of seven years from the termination of the war; and they are not without like consent to expend more than £120,000 of the capital at or in connection with the lands at St. Martin-at-Palace, including lands described in the schedule to the Act. The works and residuals powers are as in the Bill; but it is enacted that the Company shall not erect a holder on the St. Martin-at-Palace lands or on the scheduled lands without the consent of the Corporation. The basis of the charging of the expenses of management at Norwich has been altered. The Company may now charge as part of the expenses of the management of the Norwich undertaking its due proportion of the expenses of the chief office in London, including the Directors' and Auditors' fees. In ascertaining the proportion for each year or half year, the Company are to take into consideration equally: The quantity of gas sold by the several undertakings in the year or half year, and the total amount of capital expended on the several undertakings at the commencement of each year or half year. Nothing in the Act or preceding Acts is to be deemed to require the Company to hold half-yearly meetings, and hence a yearly audit is provided for. The limits of supply are extended. As to the price of gas, in the city and the parish of Cringleford the price is not to exceed 4s. 6d. per 1000 c.ft.; and within the remainder of the limits of supply as extended by the Act, the price is not to exceed 5s. 6d. But at all times the price in the added limits is to be more by at least 6d. than the price in the city. The Great Eastern Railway Company and the Midland and Great Northern Railways Joint Committee have obtained protective powers. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The Brixham Gas Company's Act is practically a reproduction of the Bill, as noticed on Jan. 1 last [p. 16]. We need only point out that to the clause providing for a pressure of 15-10ths for the gas supplied, the Great Western Railway Company have obtained a proviso to the effect that the pressure of the gas supplied to them is to be 20-10ths at the inlet of the primary meter or meters. The borrowing powers are at the rate of one-half (instead of the more ordinary one-third) of the paid-up capital. Reference to the review of the Bill will supply other particulars. [*Parliamentary Agents: Messrs. Lees & Co.*]

The Cannock, Hednesford, and District Gas Company's Bill was withdrawn; and the Cardiff Gas Company's Bill met with a similar fate.

This brings us to the Chepstow Gas Company's Act. During the progress of the Bill, there was comparatively little change; so that reference may be made to the summary of the principal provisions published on Jan. 8 last [p. 58], with certain qualifications. Before alluding to these, it may be noted that the Company have retained freedom in purchasing and dealing in secondary products. The Great Western Railway Company have obtained power to purchase, within twelve months after the passing of the Act, a strip of land, shown on a plan signed by Mr. W. Wylie Grierson on behalf of the Railway Company, and by Mr. W. Doig Gibb on behalf of the Gas Company. The application for a 450 B.Th.U. standard did not succeed; the ordinary 500 B.Th.U. standard being substituted. While the general pressure is to be 15-10ths, the Great Western Railway Company have in this case also secured the right to 20-10ths. In connection with the heavy capital commitments involved by the establishment of new gas-works and the abandonment of old, the Company asked for the right to provide a capital redemption fund by setting aside such sums of money as might be considered proper. Limitation has been applied. If the Directors think fit, they may appropriate out of the revenue in any year any sum not exceeding £1500 for the redemption fund. The total amount to be so appropriated is not to exceed one-quarter of the aggregate sum raised or borrowed under the powers of the Act (ordinary, preference, or debenture stock) within five years from the date when the Company shall first become entitled to raise or borrow moneys under the new powers. The Company desired to be relieved of the obligation to supply where the consumption has fallen below 2000 c.ft. in any quarter of the year; but we do not observe this provision now. There are no other changes, excepting that a batch of protective clauses appear in favour of the Great Western Railway Company, the Monmouthshire County Council, the Chepstow Rural District Council, the Gloucestershire County Council, and the Lydney Rural District Council. In the clauses in favour of the Chepstow Rural District Council, it is provided that the Company shall not be entitled to charge for gas in the rural area any higher price than that for the time being charged by them to ordinary consumers in any other part of the limits of supply, except that in Chapel Hill and Tintern they may charge any higher price authorized by the Act in any year succeeding any year in which the annual consumption of gas in the two parishes together amounts to less than 5 million cubic feet. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The Act of the Commercial Gas Company shows curtailment from the original Bill in respect of the clauses which sought relief for the ordinary dividend. The remainder of the Act dealing with capital and the issue of redeemable stocks stands with a small exception the same as when the Bill was reviewed on Jan. 8 [p. 59]. The small exception refers to the excision from the clause as to the issue of preference and debenture stocks of the part which proposed that, on the occasion of the first issue, the price should be such as to yield to the investor a return not exceeding in the case of the preference stock 7 p.ct. per annum, and in the case of the debenture stock 6½ p.ct. per annum. [*Parliamentary Agents: Messrs. Dyson & Co.*]

In the Gas Light and Coke Company's Act, the temporary provisions as to dividends on the ordinary stocks have been deleted. The Company obtain the power sought in respect of the issue of the debenture stock authorized by the Act of 1903 as redeemable debenture stock; and they are authorized to borrow on mortgage, or raise by the creation of debentures, any sum or sums not exceeding in the whole £750,000. But they are not to exercise the powers conferred regarding the issue as redeemable stock of the 1903 debenture stock, or to raise money by borrowing or debentures, so that the aggregate sum for the time being shall exceed £750,000, except to the extent of any sum raised shortly before the date for the redemption of any redeemable debenture stock, debentures, or mortgages, in order to redeem the same. [*Parliamentary Agents: Messrs. Dyson & Co.*]

The Hampton Court, Hastings and St. Leonards, Liverpool, and Longwood and Slaithwaite Bills were all withdrawn in view of the general legislation affecting financial relief.

There is to be a meeting of the Institution of Petroleum Technologists this evening, at which Mr. F. Mollwo Perkin, Ph.D., F.I.C., F.C.S., will read a paper on the "Production of Oil from Mineral Sources."

A CHAPTER IN THE WAR-TIME LABOUR HISTORY OF GAS-WORKS.

WOMEN WORKERS IN THE RETORT-HOUSE.

By a "JOURNAL" Representative.

THE labour position is a peculiar one at the moment. There are so many factors intruding themselves to interfere with the consideration of the matter that one finds it impossible to form any settled view as to the immediate prospects—particularly in relation to gas-works. We know there cannot be general demobilization at the moment; we know, too, that consideration will be given to the release of certain men—pivotal and specialized—who may be urgently required at home. It is known also that from munition works men and women are flocking to seek new employment; and it is known that works engaged in some of the older industries, which were transferred for a time to munitions production, are now restarting, and are absorbing the available labour which was formerly there. We are likewise aware that new industries are being established, and that labour is being attracted to them. There is consequently a migration of labour which has a disturbing effect in any attempt to vizualize the exact labour situation, or the prospects. At the time of the signing of the armistice, several gas-works were affected differently from most other manufactories. In the latter there was for the waiting work (governed by the supply of material) soon a superabundance of labour; whereas in some gas-works one of the immediate results of the armistice was that many of the men who had been released from the army—the "A.R.M.W.," or for brevity, class "W" men—for the purpose of employment at gas-works cleared off, and from some other works there is also a threatened exodus. These are men for whose release from the Army the Explosives Branch of the Dilution Section of the Labour Supply Department of the Ministry of Munitions (which has been dealing not only with gas-works, but with all employees at chemical and explosives factories) lately exercised their influence with the War Office, and were successful up to a certain number. They are men of the lower categories; and it is very hard to exercise any proper control over them. This condition and the situation of labour generally does not hold out much prospect for the immediate relief of gas-works which are suffering from the pressure of a shortage of labour. But there is a ray of hope. Recent information is that some of the Labour Exchanges have a large number of men awaiting work who are now disengaged through the turn of events. Of course, it cannot be said that such available labour would all be fit for retort-house operations; but it makes one hopeful that a proper selection and distribution would help to relieve the situation. However, this refers to the present. Another intention of this article is to allude to certain experiences in retort-house dilution.

THE LABOUR DILUTION SECTION OF THE MINISTRY OF MUNITIONS.

Allusion is made in the preceding paragraph to the Explosives Branch of the Dilution Section of the Labour Supply Department of the Ministry of Munitions; and the writer would like, now that the actual fighting on the field is over, to acknowledge the earnest endeavours of that section, and particularly of Mr. S. R. Chichester, (with whom so many gas engineers and managers have been brought into contact), to ameliorate the labour conditions in gas-works, by representation and action on their behalf, and by effective suggestion. Whether the work still continues, or whether the labours of the section for the gas industry now automatically ends, seeing that its *raison d'être* ceases, cannot be said at the time of writing. The section was only invested with responsibility in the matter owing to the needs of munitions. But as gas-works are no longer vitally necessary to the supply of explosives, strictly speaking gas-works revert to their former state of finding their own labour independently of any Government Department, or through the assistance of the Labour Exchanges.

THE INTRODUCTION OF WOMEN TO RETORT-HOUSE WORK.

Apart from the activity of the Dilution Section in obtaining the release of men from the Colours to take up gas work, perhaps the most interesting of the schemes they had in hand, and which might have proved of inestimable value had the war gone on, was the introduction of women in retort-houses. Many gas-works of their own initiative before the section came into being had sought and obtained the assistance of women in most of the light branches of their work—in fact, while before the war male labour dominated throughout the gas industry, to meet the emergency which arose through the men being called so extensively to the Colours, the dilution by women in the gas industry became very pronounced. The dilution, however, did not extend to the retort-house, until the South Metropolitan Gas Company became pioneers at Vauxhall. Into the breach which the Company made into custom and prejudice, the Dilution Section stepped, and worked hard to produce relief through the employment of women for retort-house operations. The position was at first rendered the more difficult owing to the perhaps natural prejudice and disbelief as to the fitness of women for this class of work that existed among gas engineers; but those who made the experiment were never disappointed. Moreover, had not the armistice intervened, there is no question the systematic work being done through this Department of the Ministry would have realized a large crop of fruit; and several gas-works would have borne witness to the fact that, while the ordinary retort-house men were away on their country's business, women were capable of acting as efficient substitutes. This is a feature of the plans to meet an unprecedented situation which ought for historical interest to be placed upon record, with the names of those who led in this matter.

SYSTEMATIC METHODS AND SUCCESS.

What the Dilution Section could do in the way of obtaining the release of men, only partly filled the want; and an acute position gradually became worse through the pressing need of more men for the Army. Then it was that Vauxhall produced its large-scale proof (as described in an article in the "JOURNAL" early this year) of the fitness of women for retort-house operations, including machine retort charging and discharging. The first step the section took was to get from the South Metropolitan Gas Company a number of trained women who were enrolled as women operative gas demonstrators—known shortly as "W.O.G.D.'s" The Ministry paid their salaries; and they thus became Ministry servants for the time being, and were available to be sent anywhere where a dilution scheme was necessary to show what could be done, and to assist in the training of local women. While the demonstrators were at a gas-works, it was for the works to furnish some proportion of their salaries. Then Mr. Chichester wishful to have at hand a lady who possessed full knowledge of the operations, one of the Ministry staff—Mrs. Pennington—went through all the retort-house work at Vauxhall for a month, so that she could speak and advise from experience. She has shown splendid keenness and spirit in the work; and her missionary visits to gas managers have been very much appreciated. In addition, arrangements were made with the South Metropolitan Gas Company to allow of the training at Vauxhall of women from other centres. Women from Sheffield and Newcastle were trained; and it was intended to train others if the war had continued—the South Metropolitan Company undertaking the actual training, and the Ministry contributing towards the women's expenses. Vauxhall, indeed, was made a sort of central training ground; and too much credit cannot be given for the generous spirit in which the South Metropolitan Company, the Chairman (Mr. Charles Carpenter, D.Sc.), and all others concerned in the work (more especial mention should be made of Mr. Thomas Curr, the then Station Engineer and Miss Stubbington, the Lady Superintendent) entered into it with the view of assisting the country and the gas industry. What was done in the way of training women for scoop charging at Woking has been the subject of a recent article in the "JOURNAL;" and Woking, it had been hoped, had the necessity remained, would have supplied another training-ground for scoop and rake work. At Vauxhall, too, lady superintendents were trained for Sheffield and Newcastle; and arrangements were on foot for the training of one for Luton. By direct arrangement between the Tottenham Company and the South Metropolitan Company, one was also trained for the former. We are not trying to extol what the Dilution Section of the Ministry did in these respects, but merely to place on record an interesting chapter in a notable innovation produced by the exigent conditions arising from the war in respect of man power for work at one time universally accepted as being beyond the capacity of women. The success was so pronounced that, although it came at the eleventh hour, there was assurance that, by the aid of women, there would be no occasion for gas production to collapse for want of labour.

THE SHEFFIELD CASE—UNION MEN AND THE INTRODUCTION OF RETORT-HOUSE WOMEN.

The case of Sheffield was a striking one. There was much difficulty there last winter; and for months past, the Chairman of the Company (Col. H. K. Stephenson) and Mr. Hanbury Thomas have assisted in every possible way to make a success of the dilution scheme inaugurated to meet the labour shortage. They gave the Ministry practically a free hand; and, since the advent of Mr. W. H. Johns there as Chief Engineer, no one could have worked more zealously than he in getting the scheme successfully launched. There was a great deal of difficulty in more ways than one; but a happy feature was the way in which the men eventually came into line over the question of dilution. The National Union of General Workers (of which Col. Will Thorne is the Secretary, and an ardent win-the-war worker) were opposed to women being employed for retort-house work. The question was raised at Sheffield. But the very practical course was taken of getting the local Secretary of the Union (Mr. Blackburn) and three representatives from the works, and chosen by the men themselves, to come to London to discuss the matter with Mr. Chichester, and to visit Vauxhall to see for themselves. The investigation and the discussion were of a very thorough order; and the men returned to Sheffield completely satisfied that there were no ulterior motives in what was proposed, but that the scheme was purely one to enable the Neepsend works to be carried on until the "boys came home."

At first, there was a little difficulty with some of the men at the Neepsend works; and there was an ominous look about the position. During the critical time, however, Mr. Johns, Mr. Drinkwater (the Superintendent), and Mrs. Cockshot (the Lady Superintendent), by personal example, kept things going; and no stone was left unturned to make clear to the men that this was

no endeavour to exploit them, but merely a scheme to meet the labour shortage, and one which, accordingly, every patriotic man should support. The result—and the result is always the same when the position is put clearly before labour by persons with palpably no axe to grind, and whom the men feel are speaking the truth, as the working man has shown himself absolutely sound and loyal at heart, except when misled by mischief-makers or others, who have placed their own interests before those of their country—was that the men at once came into line, and, admitting the pluck of the women in tackling the job at all, did all they could to assist them. Newcastle, Birmingham, Woking, and Richmond were other examples of this.

The personal interest that Colonel Stephenson takes in the men at Sheffield was undoubtedly a great help. Personal interest is the right thing and the only sound policy—certainly in these days. From the time the men were convinced at Sheffield, the thing was done; and they then did all they could to help. At first, owing to the unsuitable quality of the coal then being supplied, some of the charges jammed in the retorts; but the men lent a willing hand in clearing. Altogether, there were something like sixty to seventy women employed in the Neepsend retort-houses, of whom thirty had been trained in London; these in turn training the others.

The Case of Newcastle.

Turning to Newcastle. Realizing the critical position that was likely to arise with regard to retort-house labour in the winter, Mr. Thomas Hardie, the Chief Engineer, came to London to see what could be done. He at once fell in with the suggestions put before him; and a scheme was forthwith inaugurated to obtain and train a lady superintendent, and thereafter to train some women for retort-house work. Miss Upton was the lady chosen as Superintendent; and she proved a very keen and efficient worker. In due course, she completed her training at Vauxhall, and then went to Newcastle to select the women for training as stokers. This was done; and they were undergoing their training at Vauxhall when the armistice was signed. Some of them are back at Newcastle; and we presume they will still be wanted in the retort-houses, until matters in regard to man power are more relaxed than at present. But a very satisfactory point about Newcastle is that the men, realizing the need, were out to help and not to obstruct—a result which was undoubtedly assisted by the good feeling existing between the management and the men.

The Richmond Case—Manual Machine Working.

Then another instance was that of Richmond. When Mr. E. G. Hutchinson came from Carlisle, and took up the reins at Richmond, he soon found that he was going to be short of labour. At the Richmond works the retorts are operated by West's manual machinery, which was something totally different from what the women had experienced before. Mr. Hutchinson agreed at once that a dilution scheme should be started. The necessary accommodation was provided on the works, and in due course half-a-dozen of the Ministry's women operative gas demonstrators were sent. The men accepted in the right spirit the help thus provided. When the armistice took place, the women were working the machines splendidly, and everything was as satisfactory as could be. The women have since been withdrawn, owing to the fact that the armistice brought a number of men to the works' gates for employment; and there were men in the yard willing and able to do the retort-house work. At the same time, the short spell of experience was highly satisfactory. Mr. Hutchinson, from the start, took up the matter keenly, and was ready to adopt anything that was suggested which appealed to him as being sound. When it appeared necessary to withdraw the women, he endorsed the view, and expressed his appreciation of the help that had been rendered to him by the Ministry. One incident as to the willingness of the men to help. There was some trouble about the train service on Sunday mornings; and this meant that the women were late in arriving. But the men themselves found a way out of the difficulty by offering to carry on until the women came. This shows the good co-operative spirit that prevailed.

Training Women for Vertical Retorts—From Bournemouth to Prescot.

Another development was the training of women for vertical retort working. At the Bournemouth Gas Company's works, there had been a large amount of dilution; and the Dilution Section of the Ministry of Munitions asked Mr. P. G. G. Moon, the Acting Engineer and Manager, whether he could train some of the women demonstrators for operating verticals. This he readily consented to do. The women went down to Bournemouth, and subsequently Mr. Moon was able to report that they were doing very good work. Finally, they were withdrawn, and sent to Prescot, where there had been great difficulty through shortage of labour. The retorts there are both horizontals and verticals. Sufficient men were available for the horizontals, but not for the verticals. The Engineer (Mr. J. E. Hall) and his foreman themselves operated the plant for a time previous to the arrival of the women demonstrators; and then local women were trained. The last report was that things were running quite smoothly. But the position did not fully mature till the armistice; and the conditions as to men may, of course, have already undergone a change.

The Woking Case—Scoop Charging.

Woking was another instance in which the Ministry rendered considerable help when the Manager (Mr. W. H. Ely) was faced with a position that threatened disaster. The gas-works there are being operated almost entirely by women—retort-house (scoop charging and rake discharging), carburetted water-gas plant, and many of the other operations about the works. This case was fully described in an article published in the "JOURNAL" for the 3rd inst.

What Happened at Birmingham.

There was yet another scheme. That of Birmingham; and, because conditions are somewhat different, it is left as the last example of the dilution work in which the Dilution Section of the Ministry of Munitions were directly interested—one difference being that the men are members of the Municipal Workers' Union. Last winter, through the shortage of labour and the high-pressure upon the works for gas, there was much trouble. The matter was discussed by Captain Hilton with the Dilution Section, and the chief foreman also had an interview. The latter went to Vauxhall, and was convinced that women could do the work. Captain Hilton went full of doubts, and returned a convert. The result was the Gas Department set about working out their own salvation. A large deputation of men also visited Vauxhall; and between the workers and the Gas Committee a policy of dilution was agreed upon. The initial training was on the experimental plant at Nechells; and thereupon some twenty-five men downed tools. A meeting of the men was convened; and a resolution was almost unanimously passed that the policy which had been mutually agreed upon between the men and the Corporation should be loyally carried out. The men were not favourable to the agreement being treated as "a scrap of paper." Communications passed between the Ministry and the Gas Department; and as the men who had been on strike expressed regret for their action, it was agreed that there should be no penalty, provided that they showed themselves ready to train the women, as originally agreed. Everything then went on quite happily. Much credit is due to Captain Hilton's successor, Mr. A. W. Smith, who handled this matter most tactfully—as indeed he had done the whole scheme.

Two Smaller Experiences—Shovel Charging.

The Yorktown and Blackwater Gas Company offers an interesting little case of dilution. For a long time past, Mr. H. J. Randall, the Engineer, has gone ahead further than many others in adopting women labour for the duration of war conditions. So much so that the building in which a new carburetted water-gas plant is housed was mostly constructed by women. Two or three weeks ago Mr. Randall was short of labour owing to influenza; and some of the women were going to try their hands at shovel charging. He was keen over the matter; and the women were equally so. We should like to hear from Mr. Randall as to whether the trial was made; and what was the result.

There is the case of the Kinghorn Gas-Works, near Edinburgh, where the works were being run by two women, with shovel charging—the manager now and then giving a hand. One of the women was stated to be quite as expert in the use of the shovel as any man.

Opposition from Managers.

The prepossession of some gas managers as to the unsuitability of women for retort-house work does not necessarily denote any definite opposition on their part. The prepossession is a matter of tradition and ignorance; for in the majority of cases managers were as ignorant on this matter as Mr. Chichester confesses himself to have been eighteen months ago, and as we also were. The existence of the idea as to unsuitability can, however, be undermined by such demonstration as there has been during the war. But it has been found that there were managers who did not want the trouble involved by diluting with women the labour on their works. They proceeded under the impression that, as the Government wanted material for high explosives, they would somehow find men to carry on the works. But the Government are not wanting the material now; and "A.R.M.W." men are quitting their jobs, in a manner which in some cases, where other labour is not immediately available, is causing much inconvenience.

The Immediate Outlook.*

As was mentioned in the opening paragraph, the outlook for the remainder of this winter in regard to manual labour for gas-works is somewhat uncertain. Some works in localities better favoured than others in this respect are already getting in new men to fill up the gaps in unskilled occupations. But this does not apply generally. In conversation with Mr. Chichester, the writer gathered that in his view, in many gas-works, the labour problem this winter will only be solved in two ways:

(1) By the continued employment of women, and even by the extension of such employment to retort-house work.

(2) By securing the almost immediate release of trained stokers from the Colours.

The second course presents considerable difficulty; and the winter may be far spent before the men are again back in their old places facing the retorts and furnaces. The men who are being dismissed from munition factories are for the most part unskilled; and mostly of low medical category; otherwise they would be in the Army. Therefore, they are probably unsuitable for retort-house work. Even if they were not, it is unlikely that many of them would be keen to go straight from the munition-bench to the retort-bench. This, of course, is only an opinion, that may

*This article was written before the simplified plan of the Government was announced for the demobilization of men with employment awaiting them. Reference to the new plan is made in the Editorial columns.—ED., "G.J."

or may not have general application. The matter of the quick release of skilled gas men is one for the National Gas Council to bring before the Demobilization Department. Even if men cannot be released at once, they might perhaps be granted leave for two or three months, and after that they could complete their demobilization.

No Stable Foundation.

This is an interesting chapter in the history of the industry's labour troubles during the war; and it puts on record the names of works which, and some of the officials who, have taken a distinguished part in proving that a *non possumus* attitude in regard to women labour in retort-houses in times of emergency has no stable foundation.

And Thanks.

The industry has to thank the Dilution Section of the Labour Supply Department of the Ministry of Munitions for the energetic and helpful way in which they—especially Mr. Chichester and Mr. Belton—worked with the view of easing what had become a serious situation and a difficult problem. Much assistance was also rendered by Miss Monkhouse, the Chief Woman Dilution Officer of the Ministry, under whose supervision the arrangements for the the training of the women and the activities of the Women Operative Gas Demonstrators were carried out.

ELECTRICITY SUPPLY MEMORANDA.

Although the politicians—from the Premier downwards—are talking of the electrical power schemes as being among the reforms needed for the regeneration of a country that was before the war proceeding with its progress and development at a dilatory pace, all the legislative power at their command cannot compel the schemes to mature for years to come. It is a very gigantic thing upon which they are conferring their blessing; whether it will all be a gigantic success or failure, they have no more knowledge than the man in the moon. They only know what they are told by one set of advisers; while another uninvited set is clamouring at the doors of Parliament asking to be allowed to politely give the lie direct to those who have counselled the Government to take up a reckless course. Other industries, if electricity is so necessary to their existence and development, cannot wait for the completion of the great electrical schemes. There are the intervening years. Mr. S. E. Fedden, of Sheffield, is (so we understand from a letter he has contributed to "The Times Engineering Supplement") anxious to legislate for those years. A large amount of steam and gas power plant has been undergoing a serious strain the last four-and-a-half years, and is on the point of breakdown. It will within a short time (so Mr. Fedden thinks) be necessary to scrap the plant, and replace it by electric motors. The imagination of our Sheffield friend cannot stretch itself to the idea of gas-engines still having a look-in. However, as he appears to think the electric-motor is the thing that matters, we will follow his line of suggestion. Steps, in his opinion, should be taken at once to equip the power stations with the necessary generating plant; and his idea is that the Government should forthwith place on order twenty-five generating plants each of 25,000 KW. capacity, with the necessary boilers and accessories. The electricity supply industry has been told lately to open its mouth widely for Government assistance; and it is not failing to do so. The orders for such plant would, Mr. Fedden points out (presumably because he fancies his readers would otherwise fail to appreciate the fact), provide employment for a vast amount of machinery and thousands of workmen. Suitable men, he also considers, might be demobilized for this work in such numbers and at such times as the exigencies of the work might render desirable. The electric industry's men seem to be suffering badly from swollen heads just now. Everything else must be turned-down so far as other industries are concerned, in order to give electricity first place and the foremost consideration by the Government, as well as financial assistance at the expense of the whole country.

A Costly Temporary Scheme

National Munition Factories for Electrical Goods.

The way in which it is electrically assumed that electricity is going to sweep everything before it, is further illustrated by the "Electrical Review." With the termination of the war, the nation will find itself the possessor of many factories which have been constructed specially for munition purposes. It is proposed by the Government Departments that some of these shall be retained for national work and storage. But the "Review" has an idea for the disposal of a number of those that will not be required; the idea being generated through an intimation by the Ministry of Munitions that it will be pleased to receive offers from commercial or manufacturing concerns for factories in whole or part. It finds that some of these factories would be very suitable for the production of electrical goods. But as other industries will be seeking premises for extending existing activities and developing new ones, our contemporary is of opinion that the best will soon be spoken for. Therefore "it behoves us [that is to say, the electrical industry] to get in first." The faith that there is among the men of the British electrical industry is beautiful to behold. But faith should be accompanied by prudence. There is as much danger in over-doing things as in under-doing them.

Government Officials and Private Plants.

During the war there has been a large amount of control exercised from the Ministry of Munitions and other Government Departments over the electricity industry, while certain Departments have also been most accommodating in giving the industry extensive business wherever possible—such as in equipping canteens and kitchens with electrical appliances, notwithstanding all the waste they involve, from coal consumption onwards. The ordinary coal-fed kitchen range is accused of being a fearful squanderer; but it can show a much better thermal efficiency than the electricity generating plant—taking the best working in the country or the average. There are known, too, cases in which highly efficient gas apparatus has been bundled-out to make way for electricity plant; thus wasting the money of the nation. This is the result of having influential friends at court. Another way in which these friends at court have been assisting the electricity supply industry has been (while stations having a big demand for munition work have been empowered to spend money in making extensions, which is quite right and proper) by turning-down applications from manufacturers who desired to instal generating plant to make use of waste heat—the friends at court suggesting that the additional energy required should be taken instead from power stations. It will be remembered that the extravagant suggestion has been made that there should be compulsory use of electrical energy by manufacturers requiring power, and that the electricity should be taken from the ordinary distributors, and private plants be shut-down. We doubt whether there is any Government who would be willing to interfere in this way with the liberty of the subject and with the valuable force of competition. But under the enabling powers afforded by war conditions, whenever opportunity offered this sort of thing has been going on; and therefore it will be a matter for gratification when these officials with temporary autocratic powers are sent about their business, and liberty once more reigns. There are numerous private electricity generating plants which, through the excellence of the load upon them, are providing electrical requirements for all purposes cheaper than the energy could be furnished by the district cables from the central stations.

Low Costs from Private Plants.

In our editorial columns last week, when referring to the intimation of the Prime Minister that electrical power development is one of the items in the programme of the Government, quotation was made of certain views that had been expressed by Mr. W. C. Mountain in a Newcastle paper. In that same communication, Mr. Mountain alludes to the question of the disfavour of Government officials during the war towards private generating plants, and to the utilization of their position to secure business, to the manufacturers' disadvantage, for the public supply systems; and he also gives a couple of illustrations of remarkably low producing costs by private plants. These are the Parkgate Iron and Steel Company, Limited, and the Devonshire Works, both in the Midlands. The cost per unit at the former is 0·1429d. per unit, with an output in six months of 3,701,675 units; and at the latter, with an output of 17,500,000 units per annum, the cost per unit is 0·1094d. Surely one would not argue that concerns like these should be forced to take current from an electric supply company at a cost of even 0·5d. per unit. It has recently been seen that there are private plants in London, at certain large business establishments, which are operating at a lower cost than the premises could be supplied at by the local electricity purveyors. And, naturally, because there is a good diversity of demand upon the private plants, and they have no long-distance distribution costs and losses to meet.

The Brighton Cooker Tests of Long Ago.

As mentioned in an editorial article last week, headed "A Contest between Electric and Gas Ovens," the "Electrical Times" and "Electrical Industries" have found themselves obliged, in order to make a point, to fall back upon the seven or eight year old tests at Brighton with electric and gas cookers. Bearing upon this use of an ancient refuge in the hour of trouble, the following letter has been addressed by Mr. W. M. Mason, on behalf of the British Commercial Gas Association, to the Editor of the "Electrical Times:"

> I hesitate to trespass further on the space you grudge to this subject; but I must ask room just to point out that the results you quote from Brighton need two corrections, which the facts before you provided. One you ignored—the vital fact that in the case of the electric-cooker the note was made "joint not quite cooked," as against "well cooked" in the case of the gas-cooked joint. The other you treat as of no account—the difference in weight of the dripping recovered. Really, one is tempted to suggest that someone in the electrical industry should take some elementary lessons in domestic economy. It might protect the public from being fooled, and those in the industry from making fools of themselves.
>
> Correcting for dripping, the underdone joint lost 13·2 p.ct.; the well-done joint, 16·3 p.ct. The gas industry is well satisfied to publish those facts which, as you say, have been before their competitors for seven years. Yet during that time they have done

nothing to disprove them and other still more convincing tests published over six years ago, and have continued to make and still make what a writer in the "Electrical Review" of Feb. 16, 1912, called the "preposterous claims" which "have created a vast army of disappointed and disgusted consumers . . . It is business ability," he added, "that is required in the electrical industry—not the smart, insolent irresponsibility that now passes for it in so many instances." His advice may be commended still—to Mr. Belling, and others.

The "others" include our much harassed journalistic friends, who appear to be utterly lost on this subject now that an active offensive is being made against the "preposterous claims" that have been launched on behalf of electric-cookers. We hope our contemporary will find space for this letter from Mr. Mason, notwithstanding that "paper rations" was the excuse made by it for not publishing a letter from Mr. F. W. Goodenough on the subject as well as the report on the Belling contest.

Electro-Culture and Artificial Manures.

Attention is again drawn to the subject of electro-culture. "Meteor," in the "Electrical Times," weeps. He remembers that away back in the early years of the war there was some agitation concerning electro-culture. Investigation fell into the hands of the Imperial College, and of experts on such matters as fungus cytology. We remember that the enthusiasts urged that electro-culture should be taken up during the war to provide these islands with food. But the war is practically over—all but the clearing up and deciding as to what Germany is to pay for her baseness. And we have done very well without electro-culture. "Meteor's" memories are stirred by reading a letter in a Hereford paper. Referring to the once celebrated experimental farm there, the letter says: "The last I heard of it, the ground had run wild, and sheep were contentedly grazing on the herbage." Our friend does not know how fungus cytology is progressing; but he says he has a fair idea "as to the advance in electro-culture." This advance is of a negative character. Not even the electro-culture experiments at Llantwit Vadre, near Pontypridd, will help "Meteor" to happier feelings. The "Electrical Review" publishes a report upon them. The field (2·07 acres) was treated electrically in 1917, and potatoes were grown. In 1918, 41 tons of colliery manure was spread over the land; and, later, 10 cwt. of 30 p.ct. superphosphate and 2½ cwt. of sulphate of ammonia were applied. There was again electrical treatment. The results were as follows:

	1917. Tons.	Tons per Acre.	1918 Tons.	Tons per Acre.
Electrified	9·1	7·5	10·3	9·46
Control	5·5	6·4	8·2	8·40
	Increase	17·2 p.ct.	Increase	12·6 p.ct.

What do these figures prove? The excellent results of electro-culture or the excellent results of the manuring of the field? It would have been more to the point if there had been a year for comparison when potatoes were grown without either electrical treatment or manuring.

The Old Cry.

With the armistice, there comes the electrical desire to take up business getting as quickly as possible; and the old cry of cheaper wiring is again heard. Electric wiring and all its accessories are costly, if the work is done properly; and safety and Institution rules claim some consideration and responsibility on the part of electrical men—a claim to which a blind eye is often turned. However, a correspondent of the "Electrical Times" asks whether it is not time attention was given to the cheapening of the wiring of houses. Attention has been turned to it from the early days of electricity supply; and it is not likely that such attention will be withheld now. He submits as points worthy of consideration the following: The switch ceiling-rose has made its appearance; and by its use instead of the usual wall switches quite 25 p.ct. can be saved in wiring. Again, most of the supply of current is alternating. In the case of blocks of (say) ten houses, the supply company could at very little expense transform their pressure to 50 or 60 volts. "This would enable the houses to be wired with the usual wire, but without the necessity of steel tubing and its attendant expense. Lamps would also be cheaper, and low-voltage gas-filled lamps could be used, cheapening the light."

New Vice-Presidents of the B.C.G.A.—The newly elected Vice-Presidents of the British Commercial Gas Association include Messrs. Archibald P. Main and H. M. Thornton. Other fresh names in the list, as representing their respective towns, are those of Alderman George E. Davies, of Bristol, Councillor Charles F. Dixon, of Darlington, Mr. John Glasbrook, of Swansea, Alderman C. W. Pinkney, of Smethwick, and Councillor J. H. Waddington, of Halifax.

Tar as Fuel for Diesel Engines.—Increased success in the use of tar as fuel for Diesel engines has been secured by Herr O. Schertel, of Hamburg, by means of a process of filtering which is described and illustrated in the "Journal für Gasbeleuchtung." The tar undergoes some preliminary purification by passing it through a filter consisting of gravel, and then passing it again in the opposite direction—*i.e.*, from the bottom of the filter upwards—through finer gravel. The tar flows through the gravel at a very slow rate.

DEMOBILIZATION: SOME DIFFICULTIES.

By a CORRESPONDENT.

As head of the accounts department of a large gas undertaking, the writer is at present face to face with some difficulties arising out of the demobilization of those members of his staff who are at present with the Colours. These men have not suffered any financial loss by reason of their joining-up—*i.e.*, the undertaking has paid them the difference between their military pay, &c., and their salaries—and they were told that their jobs would be kept open for them.

The war has caused most of us to look into our methods; and these methods have been found in many cases to be rather roundabout and expensive. Labour-saving systems have been introduced; printed letters have taken the place of special typed ones; statistics and particulars which have outgrown their usefulness have been dispensed with; and in many other ways saving of work has been effected. The result is that there are some offices where the number of temporary clerks, &c., is fewer than the number of men who are about to return, and the difficulty will be (if all these men return at about the same time) to find them work. The writer has been turning these things over in his mind of late, and has come to the conclusion that the fairest way will be to apply first for the release of the married men, taking them in the order of their joining the Colours.

The following correspondence is relevant in this connection:

From Corporal ——— to ———.

We have to-day had a lecture by an officer of the Demobilization Committee on "Demobilization," and have been told to communicate with our employers to find if they are desirous of claiming our services. We are to be supplied with forms in a few days, and before these can be filled up we will require to know this. We were also told that all applications made by employers for the release of men would be dealt with immediately.

From ——— to Corporal ———.

I am in a somewhat difficult position owing to the fact that more members of my staff are with the Colours than there are temporary clerks, &c., taking their places; and if all the former returned here at about the same time, it would be practically impossible to find them work. In these circumstances, I feel that the fairest way is to apply first for the release of the married men. While being most anxious to keep faith with members of my staff on war service, I wish to avoid anything in the nature of hasty or ill-considered action. You will, I am sure, see the position clearly, and will conclude, I have no doubt, that no harm will accrue to you if you remain where you are for a little time longer. Perhaps you would write me again in the course of a few months—say, about the middle of March.

Gas undertakings, in common with other business establishments, owe much to their temporary employees—the countless young women and the many physically unfit or elderly men who have enabled them to "carry on." Some kindly consideration is due to them. The first intimation that their services are not further required should not be a curt week's notice to quit, but a warning of what is in store for them should be conveyed with gentleness. The following is a copy of the communication which the writer sent to those of his temporary assistants who merited the opening words:

You have rendered excellent service during the time you have been a temporary clerk-collector here, and, if it were in my power to do so, I would offer you a permanent appointment. The fact of the matter is, however, that more members of the staff are with the Colours than there are temporary assistants taking their places; and as I anticipate that all these men will desire to return to their old positions, it follows that room must be made for them. In order that you may arrange your plans, I therefore give you timely notice that it is probable I may not require your help much longer.

New South Wales and Queensland Gas Institute.—The Institute held their meeting on Oct. 22; and we are looking forward to the receipt by mail of a report of the proceedings for publication in the "JOURNAL." The officers for the year are: President, Mr. J. C. Alexander; Vice-President, Mr. J. A. M'Auliffe; Hon. Treasurer, Mr. S. J. Janes; Hon. Secretary, Mr. H. Tindale; Members of Counil, Messrs. A. G. Ambrose, T. F. Waugh, and A. Langwell; Auditors, Messrs. E. Foster and A. H. Smedley; Trustees, Messrs. R. J. Lukey and T. R. Morland. The meeting unanimously passed a resolution that all gas companies who wished to be able to guarantee a permanent supply of gas should keep at least three months' supply of coal on hand.

Bye-Products Works for Australia.—Attempts have at different times, with more or less success, been made to establish bye-product plants in Australia; and now Mr. John T. Wynne, who was for many years Chief Engineer of the Melbourne Metropolitan Gas Company, on behalf of English and Australian capitalists, proposes to establish large coke and bye-products works at Newcastle, involving a capital outlay of between £200,000 and £300,000. The Company hope to make a commencement with the erection of works during the early part of next year. Altogether from 200,000 to 250,000 tons of coal will be mined annually, of which one-third will be used for coke-making and the balance specially treated for commercial purposes not yet undertaken in Australia.

BENZOL AS A MOTOR FUEL.

By S. E. WHITEHEAD, B.Sc. Eng. (Lond.), F.C.S.

[COPYRIGHT.]

WHILE the recovery of crude benzol at gas-works has played a most important part in the successful prosecution of the war, the future of the plant erected for the purpose seems, in some cases, rather doubtful. It is quite certain that the nation's fuel supply must be conserved in every possible way, if prosperity is to be assured; so that, clearly, the nation as a whole cannot afford to burn valuable benzol in its gas-burners, furnaces, and other appliances. That the benzol is not really essential to the effective use of the gas is clearly shown by the preliminary report of the Gas Investigation Committee—especially when it is remembered that the recovery of one gallon of crude benzol per ton of coal reduces the calorific value of the gas by only about 12 B.Th.U.; while at the same time reducing the amount of air required for combustion to such an extent that the theoretical or calculated flame temperature is usually equal to, and in some cases higher than, that of the original unstripped gas.

The extended use of electricity has received a great impetus during the war; and this means increased competition with gas undertakings where every source of additional income must be carefully examined and developed. The gas industry, therefore, cannot afford to distribute as a vapour a material which is worth fifteen to twenty times as much when sold in its liquid form.

Although benzol is known to be an efficient motor fuel, its claims in this direction have not been made known to a sufficient extent, even in the gas industry. It is, therefore, felt that a résumé of the somewhat scattered literature on the subject would be welcomed by many gas engineers at the present time, when the question of the post-war marketing of benzol is claiming their attention. This the writer has endeavoured to offer in the present article.

As long ago as 1907, a Committee appointed by the Motor Union (under the chairmanship of Prof. Hele Shaw) investigated the question of motor fuels. They subsequently published a report, of which one of the recommendations was:

> "That the notice of members of the Motor Union be directed to the use of benzol, either alone or in combination with petrol, as a motor fuel, since it can be used with complete success with the present types of engines and carburettors. Moreover, it is a home production, and more economical in use than petrol at the present time."

This Committee's report does not appear to have had the publicity which its exhaustive character merited; while other papers on the same subject are contained in the "Transactions of the Institution of Automobile Engineers" and other bodies, and are therefore not readily accessible to many people.

In view of this recommendation, and of the amount of coke-oven benzol used in pre-war days as a petrol substitute, it is perhaps superfluous to refer to the possibility of using the spirit in the modern petrol engine. Spray carburettors are now practically universal; and the only necessary alteration to them is a slight adjustment of the air supply per gallon of fuel.

In his book on "The Gas, Oil, and Petrol Engine," Sir Dugald Clerk quotes the following requirements for a suitable motor fuel:

(i.) Easy starting from cold.
(ii.) Absence of objectionable odour, both in the fuel itself and in the exhaust products.
(iii.) No liability to form deposits in the cylinders and valve passages.
(iv.) Economical consumption.

To (ii.) the writer would add: "and no liability to cause excessive corrosion of any part of the engine."

It will be convenient to examine the available information on the use of benzol under these headings.

EASE OF STARTING.

One remembers hearing a great deal about difficulties of starting on petrol, through selective evaporation in surface carburettors. Benzol might conceivably have reduced this particular trouble owing to its more homogeneous composition. But, before its advent, spray (or jet) carburettors were very generally adopted; and starting troubles had nearly disappeared. At the usual range of atmospheric temperature in this country, the vapour tension of pre-war petrol was 60 or 70 p.ct. greater than that of benzol; and starting from cold was undoubtedly easier with the former fuel. Owing, however, to the demand being so considerably in excess of the supply during recent years, the specific gravity of petrol imported into this country has risen appreciably, with a corresponding reduction in its vapour pressure. It is well known that, in the paraffin series of hydrocarbons, this falling off is a rapid one; and it is, therefore, very doubtful if petrol of this and future years will have in this respect any material advantage over benzol. Should the advent of "cracked spirits" assist in keeping up the vapour tension of our fuel supply, benzol can easily be "livened-up" by the addition of sufficient petrol to give equal ease in starting. The addition of acetylene, which is fairly soluble in benzol, and which appears to remain in solution for a considerable time, also offers the same advantage. As soon as the engine is warm, vapour tension differences cease to have any practical importance. In any case, the difficulty will usually arise only in starting on the switch; since by giving the crank-shaft a few turns, enough liquid can be sprayed into the combustion chamber to render ignition possible.

The possibility of solidification in the tank has often been cited as an argument against the use of benzol. While pure benzene certainly freezes at about 6° C., the benzol used as fuel will almost always contain such a proportion of toluene, xylenes, paraffins, &c., as will prevent any trouble, at any rate in this country. Commercial 50/90 benzol will not usually show any sign of solidification until a temperature of about −10° C. is reached; and the addition of a small proportion of petrol considerably reduces the freezing point.

ABSENCE OF ODOUR AND CORROSION.

The question of odour of the fuel itself appears to be of no importance outside the garage; and a considerable increase in the "miles per shilling" would probably overcome the objections on this score of the most æsthetic motorist. The odour of the products of combustion, however, presents a more serious problem the solution of which depends upon:

(*a*) Completeness of the combustion.
(*b*) Sulphur content of the fuel.

As regards (*a*), the proper adjustment of the air supply is a comparatively simple matter. This naturally leads to the consideration of mixture strength. Theoretically 1 lb. of benzene requires about 13 lbs. of air for combustion (representing a volume ratio of about 1 : 38), as compared with about 14 lbs. of air per pound of petrol. Owing, however, to the greater specific gravity of benzol, to the presence in it of considerable quantities of higher boiling hydrocarbons, and to the higher carbon/hydrogen ratio of the latter fuel, it is found in practice that the necessary air per gallon of benzol, in order to prevent an offensive exhaust and sooting in the cylinder, is somewhat greater than is the case with petrol.

In considering (*b*), the sulphur content of benzol, it must be remembered that petrol is practically free (more by accident than design) from this impurity. An average figure for petrol is 0·05 p.ct. of S, corresponding to about 25 grains per gallon; and with this amount it is quite impossible by smell to detect SO_2 in the exhaust. It is quite certain that much more sulphur can be allowed, without any serious drawback; and in fact the Petrol Substitutes Committee of the R.A.C., which is now considering the question, states that: "It would seem that anything up to 250 or even 300 grains of sulphur per gallon of spirit may be allowed, without a malodorous exhaust being produced, or any chemical action being caused on the metals in the engine."

An average 65's crude benzol contains up to 1 p.ct. each (by volume) of carbon disulphide (CS_2) and thiophene (C_4H_4S). The bulk of the CS_2 is removed in the forerunnings; and the thiophene can be very easily (and comparatively cheaply) reduced by drastic washing with sulphuric acid, or by the chlorination process recently patented by Dutt and Hamer. By these means, we may obtain a rectified product containing (say) 0·1 p.ct. of CS_2, and 0·2 p.ct. of C_4H_4S. This means a total sulphur content of only 90 to 95 grains per gallon; so that the amount of sulphur dioxide in the exhaust may apparently be ignored.

In his evidence before the Motor Union Fuel Committee, Mr. Edmond Ledoux stated that he had used unwashed 65's benzol in a 16 H.P. car with every success; but the smell was objectionable. The odour of the fuel itself was worse than that of the exhaust. It is interesting to note that Mr. Ledoux noticed no difference between this fuel and petrol as regards starting the engine from cold—presumably owing to the presence of fore-runnings of high vapour pressure. Mr. W. A. Bower, before the same Committee, gave the sulphur content of commercial benzol as 150 grains per gallon; and he expressed the opinion that unwashed benzol could be made suitable for motors by distillation only—the bulk of the sulphur being eliminated in the fore-runnings. Dr. W. Watson found no signs of corrosion in a car-engine (80 mm. by 120 mm.) after running for 2000 miles on refined coke-oven benzol. It is, therefore, quite clear that the sulphur in benzol need not be feared, though Prof. Brame considers that the peculiarities of a benzol exhaust are more probably due to the incomplete combustion of polymerized hydrocarbons than to sulphur.

This matter naturally leads one to inquire what are the conditions as to sulphur in a gas-engine; and it is interesting to note that a gas containing 40 grains of sulphur per 100 c.ft. will result in about 5 grains of sulphur per 100 c.ft. of mixture before ignition. Similarly, a benzol containing 100 grains of sulphur per gallon will give a mixture having a sulphur content of 6 grains per 100 c.ft.—a figure which gives no cause for alarm when one remembers the comparative immunity from corrosion that the modern gas-engine enjoys. If any corrosion follows the use of benzol, it would be almost entirely due to sulphur. It must be remembered, however, that no appreciable action will take place unless the SO_2 is dissolved in water in the liquid state; and therefore any corrosion will, in practice, be limited to portions of the engine normally at a temperature below 100° C. Thus the only parts exposed to danger are the silencer and (possibly) parts of the exhaust pipe. Occasional renewal of a silencer is insignificant when compared with any considerable saving in fuel cost.

LIABILITY TO FORM DEPOSITS IN THE ENGINE.

With benzol, this is undoubtedly a problem to be solved. Deposits are of two kinds—carbon resulting from incomplete com-

bustion, and resinous matter formed by polymerization of hydrocarbons. The former has been shown to be avoidable by proper adjustment of the air supply to the carburettor and the cylinder. [No difficulty is experienced in feeding benzol to an ordinary petrol carburettor, since the higher specific gravity tends automatically to adjust the float.] In the course of his evidence, already mentioned, Mr. Ledoux stated that the benzol caused the formation of a certain amount of soot, but not sufficient to give trouble. This was crude benzol. The combustion of rectified spirit would not have the same tendency to "soot up" the cylinders, owing to the absence of the higher boiling constituents of the crude, derived originally from the wash-oil. The engine described by Dr. Watson had only a very thin coating of carbon after consuming refined benzol on a trip of 2000 miles. He states that, so long as the mixture strength is properly adjusted, the carbon deposit is no worse than with petrol.

"Gumming-up" presents a somewhat more difficult subject. The resins which cause this trouble appear to be formed by the polymerization and oxidation of liquid hydrocarbons into solids. Spilker ["Journal of the Society of Chemical Industry," 1910, p. 616] attributes this effect—which he found only with crude, and not with refined, benzol—to cyclopentadiene, C_5H_6 (b. pt., 41° C.; sp. gr., 0·815). Other constituents of crude benzol which there is no doubt assist in this gumming action are dicyclopentadiene, $C_{10}H_{12}$ (b.pt., 170° C.; sp. gr., 0·977) and coumarone, C_8H_6O (b.pt., 172° C.; sp. gr., 1·096), both of which are readily oxidized to resins. It must be recollected that the atmosphere in a properly regulated internal combustion engine always contains an excess of oxygen. All these substances occur in crude benzol; but they are quickly extracted by acid washing, and are removed in the acid tar. It would, therefore, appear that a well-refined benzol would be free from this gumming tendency.

Economical Consumption.

This is, in practice, probably the most important aspect of the fuel question; and there is no doubt whatever that the advantage lies with benzol as regards both the power output per gallon and the thermal efficiency of the engine. The question of output and relative cost has been considered recently by Mr. W. R. Ormandy, D.Sc. [see "Journal" for Nov. 26, p. 463]; and it is not proposed to discuss it again, except to point out that for some years, at any rate, it will be possible to market a good refined motor benzol at a price per gallon less than that of petrol, and with a reasonable profit. As regards the more distant future, this is, of course, rather uncertain; but at present one forms the opinion that the value of benzol will rise steadily as the world's supply of petrol gets exhausted.

An examination of published tests shows that benzol, used on an ordinary petrol engine under similar conditions of compression, &c., will give 10 to 12 p.ct. more power, and 20 p.ct. more mileage per gallon than petrol. The calorific value of 1 lb. of benzol is slightly less than that of 1 lb. of petrol; but when the calorific power is expressed in B.Th.U. per gallon, the spirit with the higher specific gravity has also the higher thermal value. Motor spirit is sold by the gallon, and the capacity of a petrol tank is expressed in gallons. Clearly, then, the practical calorific figure for motor fuel is the net value expressed in B.Th.U. per gallon. The values given by Prof. Brame are as follows:

Fuel.	Sp. Gr.	Calorific Value.	
		B.Th.U. per Pound.	B.Th.U. per Gallon.
Petrol (pre-war)	0·680 to 0·760	18,450	132,500
Benzol (90's)	0·883	17,100	150,000
Methylated alcohol	0·820	10,350	84,900

The increased power output referred to above was in every case obtained with the compression ratio under which the engine was designed to use petrol, and which is usually about 70 to 75 lbs. per square inch. The spontaneous ignition temperature of benzol is, however, much higher than that of petrol; and, consequently, a compression of 150 to 160 lbs. may be employed without danger of preignition—the result being a corresponding increase in thermal efficiency. It is a very simple matter to increase the compression ratio of an engine; and this should obviously be done whenever it is intended to use benzol solely—provided that the construction of the cylinder is strong enough to take the increased stresses. In passing, one may quote, from H. Moore's "Liquid Fuels," the case of an engine which gave 20 p.ct. thermal efficiency with petrol. This value was increased to 35 p.ct. with alcohol, merely by raising the compression to 200 lbs.—a pressure that is possible only with alcohol fuel.

Returning to the superiority of benzol as a power producer, the following tests, performed without alteration of the compression ratio, may be of interest:

(i.) Lord Montagu, before the Motor Union Committee, mentioned a test on a 10 to 12 H.P. Coventry-Humber, fitted with a Longuemare carburettor. The mileage per gallon was 15·7 with petrol, and 21·38 with benzol. After 1000 miles on the latter fuel, the valves were removed; and it was found that there had been no sooting, very little pitting, and the sparking-plugs were in good order.

(ii.) In the trial described by Mr. Ledoux, unwashed 65's benzol gave 20 p.ct. greater mileage than petrol.

(iii.) Dieterich obtained the following results in kilometres per litre: Petrol, 8; heavy petrol, 7; benzol, 9.

(iv.) Ormandy, experimenting with a four-cylinder 17 H.P. Maudslay engine, found 1·25 p.ct. less power, and 15·5 p.ct. less fuel consumption, on benzol than when using petrol. This test was performed at about 1000 R.P.M.; and it shows that benzol developed nearly 17 p.ct. more power per gallon than petrol. Tests on the same engine at speeds varying from 700 to 1500 R.P.M. show an average thermal efficiency of 22·4 p.ct. on benzol, against 20·4 p.ct. on petrol.

(v.) J. S. S. Brame quotes a test on a 12 H.P. stationary engine, where benzol proved 12·5 p.ct. more efficient than petrol.

(vi.) Tests by Brewer on a six-cylinder, 40 H.P., Napier car gave a ratio of miles per gallon on benzol as compared with petrol of 1·25 : 1.

(vii.) In similar trials mentioned in the Motor Union report, this ratio was found to be 1·36 : 1.

Other Advantages of Benzol.

From these figures, it is clearly seen that benzol is a more powerful fuel than petrol. It offers other advantages not covered by the above requirements. First, perhaps, comes the fact that the explosive range of mixtures of benzol vapour and air is nearly twice that found with petrol; and consequently troubles from too weak or too rich a mixture are considerably reduced. The practical advantage when driving is obvious. The rate of combustion of a benzol mixture is less than that of the corresponding petrol mixture; and this results in the total elimination of "pinking"—the knock so often noticed in an engine running at low speeds on the latter fuel. The higher flash-point of benzol also makes it safer in handling and transport than the more volatile spirit.

While, then, there is no doubt as to the practicability and economy of using benzol as a motor fuel, it must be borne in mind that the supplies of petrol are not inexhaustible, and that if every available gallon of benzol in this country were recovered, the total quantity—further reduced by the demands of the dyestuffs, explosives, and other industries—would be sufficient to satisfy only a fraction of our fuel requirements. One is forced to agree with the late Prof. Lewes that the use of alcohol as a fuel must come; and in this connection the utility of benzol is undoubted. Alcohol requires a livening agent; and while alcohol and petrol will not mix freely, alcohol and benzol are miscible in all proportions. Mr. Ormandy has shown, in his paper to the Institution of Automobile Engineers, that such a mixture makes an excellent motor fuel; and there is good reason to anticipate that it will be the fuel of the future. This class of mixture, often with the addition of naphthalene, has been largely used on the Continent; and Prof. Lewes gives the following example:

95 p.ct. alcohol	80 litres.
Benzol	20 ,,
Naphthalene	200 grammes.

These mixtures are more homogeneous than petrol, and are found to result in steady running, provided that extra heat is furnished to the induction pipe. This results in no loss of efficiency, since waste heat is employed.

The Future of Benzol Recovery.

Given suitable statutory facilities, there appears to be no reason why the recovery of benzol at gas-works should cease with the end of the war, but rather that it should be fostered and extended as a profitable adjunct to our pre-war conditions. That benzol recovery, if properly supervised, can be made profitable is proved in the case of scores of undertakings throughout the country; and it must be remembered that the presence of paraffins—which, owing to the impossibility of their removal before nitration for the manufacture of explosives, has hitherto been an objection in the case of vertical retorts—will be in no way detrimental if the spirit is to be used in engines.

In conclusion, the writer would urge the desirability of more research work upon the subject, with the object of evolving a standard specification for "motor-benzol," and of finding out the minimum amount of rectification necessary to render it a thoroughly reliable fuel. To this subject, as well as to the question of testing, attention was drawn in Mr. Wynter Blyth's timely letter in the "Journal" of the 3rd inst.

For more detailed information on the matter here briefly reviewed, reference may be made to the following works:

Clerk and Burls. "The Gas, Oil, and Petrol Engine," Vol. II.
V. B. Lewes, "Liquid and Gaseous Fuels."
J. S. S. Brame, "Fuel."
H. Moore, "Liquid Fuels for Internal Combustion Engines."
Motor Union "Report of Fuel Committee" [*out of print*].
W. Watson, "Various Fuels for Internal Combustion Engines," Proc. Inst. Auto. Eng., IX., 73.
W. R. Ormandy, "Some Experiments on Mixed Fuels," Proc. Inst. Auto. Eng., VIII., 49.
J. S. Critchley, "The Fuel Question," Proc. Inst. Auto. Eng., VIII., 5.
V. B. Lewes, "Motor Fuels," Fothergill Lectures, Royal Society of Arts, 1915.

INSTITUTION OF GAS ENGINEERS.

Minutes of Council Meeting, Dec. 5.

A meeting of the Council was held at No. 39, Victoria Street, Westminster, on Thursday the 5th inst.—Mr. SAMUEL GLOVER (President) in the chair.

The deaths of the following members were reported, and the Council expressed their sympathy with those who had been bereaved: Mr. P. P. Channon, of Haywards Heath, Mr. T. H. Duxbury, of South Shields, Mr. J. Magrath, of Cork, and Mr. F. W. Rapkin, of Dartford.

The following were approved as candidates for the class of member: Mr. George Porteous Mitchell, of Falkirk, and Mr. Douglas Ritchie, of the Ash Road Gas-Works, Aldershot.

Mr. H. C. Head, of Winchester, was appointed to act as *locum tenens* of Lord Moulton, on the Executive Committee of the National Gas Council.

The report of the Demobilization Committee was adopted; the letter which had been issued to the Technical Press was approved; and the action of the Committee received the entire support of the Council.

It was announced that Mr. John Mogford, of Briton Ferry, had been appointed representative of the Wales and Monmouthshire District Institution of Gas Engineers. for the year 1919-20.

On the recommendation of the Manchester District Institution of Gas Engineers, sixteen certificates for gas-fitters were ordered to be prepared for issue.

A letter was reported from the Chairman of the conference on the proposed amendment of the Patents Act, stating that it was considered that the difficulties of obtaining a second reading for a Private Bill to amend the Patent Law would be so great as to be practically insuperable. It was, therefore, thought that action in this direction would be useless. With reference to the new Patents Bill now in course of preparation by the Board of Trade, the Committee propose to examine it, and report upon it when copies are obtainable.

COAL AND HEALTH.

Lecture by Prof. W. A. BONE, D.Sc., F.R.S.

The Lady Priestley Memorial Lecture for 1918 to the National Health Society was delivered by Prof. Bone in the Chemical Theatre of the Imperial College of Science and Technology last Tuesday afternoon. Sir JAMES CRICHTON BROWNE, M.D., F.R.S. (the President of the Society), occupied the chair.

The PRESIDENT, in introducing the lecturer, referred to the enormous importance of coal to Great Britain and the Empire, and said that the deplorable wastefulness in using it was not only a grave injury to health but to public morals as well. Having regard to present circumstances, no better subject than "Coal and Health" could have been selected for the Lady Priestley Memorial Lecture this year. Prof. Bone's recent book on "Coal and its Scientific Uses" had shown how coal and iron constitute the basis of the material prosperity of the nation. The proper use of coal was essential to the permanent improvement in public health which post-war measures of reform would be framed to achieve. He hoped that the Allies would take possession of, and control, the German coalfields in their entirety, as part of the war indemnity, and as a guarantee against future misuse of them.

THE TRUE VALUE OF COAL.

Prof. BONE, in his opening remarks, said if it was still true to say, as did Jevons more than fifty years ago in his great work on the "Coal Question," that coal "is the material source of the energy of the country—the universal aid—the factor in everything we do" (a dictum which the war had abundantly confirmed), then it might be asserted with equal confidence that the health, as well as the wealth, of the whole community is intimately bound up with the proper use of coal, whether in manufacturing operations or as a domestic fuel. The abatement of atmospheric pollution by smoke and the proper heating and ventilation of our houses were matters which ought to, and doubtless would, concern the new Ministry of Health when it came into being. It was the duty of all scientific reformers to create and maintain public opinion strong enough to overcome official apathy and red-tape. One thing which the nation ought to have learnt from the war was the true value of its coal. For not only was it the source of practically all its artificial light, heat, and power, but, in the hands of the chemist, it yielded a whole series of valuable bye-products which either form the raw materials for the manufacture of high explosives, synthetic drugs, disinfectants, and dyes, or may be employed as motor spirit and fuel oils, or by the farmer as fertilizers in the production of food for man and beast.

HIGH AND LOW TEMPERATURE CARBONIZATION.

The high temperature carbonization industries, whether in relation to public gas supplies or to the manufacture of metallurgical coke, had acquired an importance in our national economy unrecognized before, because they constituted the best means for recovering such bye-products—thus enabling, for many purposes, the fullest advantage to be derived from coal. Explaining how bituminous coals behaved when carbonized in retorts or chambers at high temperatures, and what bye-products were obtained by such processes, the lecturer said that most of these had a direct connection with public health. Thus, for example, coke was not only a smokeless fuel, but it was well adapted for burning in central heating apparatus. The gas was a clean, convenient, and, for many purposes, an economical and labour-saving domestic fuel. Pitch and tar were used in street paving and to render roads dustless (tar-macadam). Ammonium sulphate was a most potent fertilizer in raising crops of all kinds. Phenols were powerful antiseptics and disinfectants; while the benzols and coal-tar products generally formed the starting points for the manufacture of a whole series of synthetic drugs and antiseptics, a number of which were exhibited on the lecture table as having been made in the laboratories of the Imperial College of Science and Technology for hospital use during the war.

In referring to the future possibilities of what was commonly termed low-temperature carbonization, Prof. Bone said that it had been claimed at various times that low-temperature carbonization provided a solution of the domestic smoke problem. On paper, such schemes could be made to appear very attractive; but, so far, nothing very substantial had ever materialized from them, although progress was being made. He did not despair of an ultimate solution being found, but the crux of the question was the manufacture of a smokeless fuel in a form that would stand transport, and at a price which should not exceed that of raw coal—conditions that had not yet been fulfilled.

THE SMOKE NUISANCE AND PUBLIC HEALTH.

The lecturer next proceeded to deal at some length with the question of the smoke nuisance and its abatement. He had estimated, from the best available data, that the smoke and soot annually produced by our domestic fires and in factory furnaces amounted altogether to a total of nearly 10,000,000 tons. Domestic soot was undoubtedly, weight for weight, more pernicious than factory soot in its direct effects upon human and vegetable life. The more serious and continuous results of smoke upon public health were probably due to the great reduction of sunlight by the overhanging smoke pall in our large industrial centres. It had been shown that in Manchester as much as 50 p.ct. of the total actinic rays of sunlight were cut off by smoke, and that the pall of smoke which continually hangs over the City of Leeds absorbed as much as 40 p.ct. of the total daylight during the year. It was to this continual reduction in the available sunlight that the more insidious and serious effects of smoke upon human vitality and vegetable growth must be attributed, and from this point of view its effects upon the healthy development of children were most deplorable.

To the chemist, the smoke nuisance must appear in a double sense as a national reproach and loss; for not only did it represent a preventable source of damage to buildings, furniture, fabrics, human vitality, and plant life, but also a prodigious loss of valuable bye-products, which, under scientific organization and control, might be recovered for the service of man. The proposals of the Coal Conservation Committee for the post-war development of electric power throughout the country would, if carried out, certainly mitigate the smoke nuisance considerably, and, generally speaking, promote healthier conditions in factories.

DOMESTIC HEATING AND VENTILATION.

In the latter part of his lecture, Prof. Bone dealt with the question of domestic heating and ventilation in the light of recent physiological research. He showed how conditions of comfort and health in living rooms could now be scientifically defined and measured, and referred in detail to the results of investigations recently carried out by Dr. E. V. Hill, of Chicago, and by Dr. Leonard Hill and his collaborators in this country. He exhibited and explained the use of the kata-thermometer, designed by Dr. Hill, so as to measure the cooling power of a given environment, and therefore its fitness, or otherwise, for human occupation and work. Physiological research had shown that it was not the chemical purity so much as the physical conditions of the atmosphere which acted so potently upon us. The natural conditions of comfort and health were those prevailing out of doors on a balmy summer's day—namely, the warm ground for the feet, the radiant heat of the sun on one side of the body, and a cooling breeze blowing on the other side and round the head. Monotony in such conditions was to be avoided. The cooling and drying breeze round the head meant that more arterial blood had to pass through the respiratory membrane and air tissues to maintain the body temperature in these parts, and far more lymph had to pass through the membrane to maintain the evaporation to saturate the drying air. In contrast to these ideal conditions of health were the tropical and monotonous conditions of the warm, humid air of crowded rooms heated by steam-coils.

Defending and supporting, on scientific grounds, the Englishman's preference for the open fire, as against the Continental practice of heating rooms by means of closed stoves, Prof. Bone said that, apart from the smokiness (which certainly ought to be remedied), the Englishman's open fireplace, which was not thermally so wasteful as many people supposed, did not come out of the ordeal of scientific investigation so very badly after all.

In the concluding portions of his lecture, he explained how radiation was measured, and its importance to health and comfort. He then went on to compare the radiant efficiencies of coal and gas fires, and to expound the correct principles on which

these should be constructed. And in illustration of his remarks, he referred in detail to the scientific construction of the "Teale" fireplaces, and later on to that of "ventilating" gas-fires. He dealt with the equivalence of coal and gas for heating purposes, saying that while the prime cost of coal was undoubtedly much less than that of gas, the latter was much cleaner, and had the advantage of saving labour as well. The preference for one over the other depended very largely upon circumstances and upon individual predilection. He emphasized the importance, from the hygienic point of view, of the ventilating capacity of the open fireplace, and showed that nowadays gas-fires were constructed which would ventilate a room almost, if not quite, as well as a coal-fire. In fact, there was no ground whatever for supposing that the modern gas-fire was anything but a clean and altogether healthy appliance.

A CRITICISM OF THE COAL CONTROL DEPARTMENT.

At various times in the course of his lecture Prof. Bone criticized some of the unscientific methods adopted by the so-called experts of the Coal Control Department, and said that they were the only people who still clung to the old fallacy that an ordinary thermometer is by itself of any use in estimating either the heating efficiency of a fire or the healthiness of a room in which it is burning. He hoped that, with the oncoming of peace, the operations of the Coal Controller, which have necessarily caused great inconvenience and in some cases hardship also, will quickly disappear, and

> Fly forgotten as a dream
> Dies at the opening day.

The lecture was illustrated by numerous lantern slides, by exhibits of coal, coke, "semi-coke," and various "bye-products" from coal, as well as by experiments with the kata-thermometer, on the measurement of radiation, and on the low-temperature distillation of coal.

VOTES OF THANKS.

Prof. ARMSTRONG, in proposing a vote of thanks to the lecturer, said he hoped that the audience would keep in mind and profit by the valuable lessons which the lecture contained. He agreed with what the lecturer had said about the open fire-place, and that the ultimate solution of the domestic smoke problem would probably lie in the direction of providing a smokeless fuel. He spoke very hopefully of the near approach of the time when such a solution will be forthcoming. He thought they were now very near it, and that many important future developments might be looked for.

The vote was seconded by Mr. W. R. E. COLES and carried with acclamation.

A vote of thanks was also accorded to the Chairman; and the proceedings then terminated.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Discussion of the President's Address.

After the inspection of the Wallasey Corporation Gas-Works, an account of which appeared in last week's issue, the members of the Association discussed the Presidential Address that was delivered by Mr. C. E. Teasdale, of Salford, in the early part of this year—see "JOURNAL" for April 9, p. 56.

Mr. A. L. HOLTON (Manchester) said that in his address the President spoke at some length on the need for a better understanding between the management and the worker, and also of the advisability of establishing a Works Committee to bring this about. In May, 1914, a Workers' Welfare Committee was formed at the Bradford Road Gas-Works of the Manchester Corporation; and of this he (Mr. Holton) had been Chairman since its commencement. It was necessary for them all to live-down the old idea of getting work done at the lowest possible individual wage expenditure, no matter if the amount earned was only just sufficient to keep body and soul together. The better way surely was to aim at securing a worker whose remuneration enabled him to live in comparative comfort and contentment. A low priced worker was by no means the best bargain. Any antagonism existing existing between masters and men must not be laid exclusively to the charge of either one or the other. If they could not secure the complete removal of all differences at one sweep, it behoved them to adopt the means at hand for hastening on the desired result. One of these means was a Works Committee. Such Committees formed part of the scheme presented in the Whitley report.

Mr. W. L. HEALD (Preston) dealt with the more practical side of the address. As an Association, he said, they had visited many works, and had seen that the stores were often the last place to receive attention. The Preston Gas-Works had a stores of which he justly felt proud, they had over 8000 boxes or pigeon-holes for storing goods, and every one of these was required. He considered that the store, in practically all works, was a place where they could make a start for higher efficiency. He had made a little experiment with the grading of spades. It was no use giving a 23 in. by 18 in. spade to a weak-chested man, and expect him to use it efficiently. In emptying the purifiers at Preston, where each purifier contained a matter of 250 tons, he had used two different weights of shovels, but both of the same size. This was an effort to see if something practical could not be done arising out of the remarks of the President. He was unable to say that there was any improvement; but there had been a gain by changing the type of barrow used. He had noted that the lighter legged men were far handier in the use of the new barrow; and the men all admitted that the barrows were an improvement on those employed previously. Another point brought to his notice from the address was the running of elevators or conveyors when not in use. In his own works he had found them running unnecessarily; but this was not so now. He advised the members to look out for such things in their own works. Co-partnership had been in operation in Preston for about seven years; but of a membership of about 200 or 250, he was sorry to say that there were very few who were in any way better off than previously, and they appeared to have no desire to rise to a better condition. It was necessary for the works manager to be tactful. Assistants should be judged by their tact and personality, as well as their engineering abilities. It was in these days far better to have a tactful assistant than one who was over-keen on keeping all down. From experience, he had found that it was not the old employees who were the agitators, but those who had been there only a short time.

Mr. S. E. WHITEHEAD (Ministry of Munitions) was unable to be present at the meeting, but sent the following written contribution. There are many points to discuss in the President's address, though I fancy we all agree with most of his remarks. Labour conditions and other problems will be acute for some time. High wages have come to stay; and the only way to counterbalance them is to increase output in quality and quantity—*i.e.*, to increase all-round efficiency. Organization and management have recently developed into a new science, especially in the United States. Most of the American books on the subject deal with machine-tool and repetition work; but the President has shown us how many of the lessons can be applied to gas-works. I will leave that to speakers with more experience of the subject. It should be remembered, however, that Dr. Taylor, the pioneer of scientific management, was first and foremost a scientific engineer. In any technical concern scientific management must be accompanied by the effective application of science to processes. Gas manufacture is a chemical process. Gas engineering must be recognized as chemical engineering. As such, it calls for the best application of science—engineering science, chemistry, and physics—to its problems. There are, of course, many men in our profession (managers, assistants, and chemists) who are first-rate scientists. On the other hand, there are many gas-works where science is practically ignored. As regards engineering, this is not so apparent, since most gas men have received a mechanical training. In matters of construction and plant, there is perhaps little to be desired. But if the President has emphasized one point in his address, it is "attend to the details;" and yet we find such engineering "details" as lagging of steam-pipes, attention to pump-valves, and adjustment of bearings, often neglected. These are all sources of loss in efficiency, and therefore of loss in money. As regards physics and chemistry, however, the general position is much worse. There can be no doubt that the small expenditure entailed in making chemical tests is more than repaid on any but the very smallest gas-works; and in a works of any size, I consider one of the first essentials to economy and efficiency is a trained chemist with adequate laboratory equipment. This is not an ideal or a luxury—it is a necessity. Yet many gas-works of average size are at present without any chemical apparatus whatever. The financial aspect of chemical control is not yet realized. For instance, take a 150 million c.ft. works. Now 1 per cent. of CO in the waste gases means roughly a money loss of about £30 per annum. Yet how many 150 million c.ft. works ever analyze their waste gases? On the same works, 5 grains of ammonia passing the scrubbers—and this is by no means difficult to find—means 2 tons of sulphate, or £30 per annum. A difference of only 0·02 p.ct. of ammonia in the effluent liquor from the sulphate still on the works would represent, perhaps, £33 per annum. To obviate these losses by rule of thumb, means excess of secondary air, weak liquor, or waste of lime, as the case may be—all wasteful. All these and many other items can be saved by chemical control, apart from the saving to be effected in purchasing such material as coal, oxide, oil, paint, &c., on results of analysis and tests. Surely it is not difficult for a live works' chemist to save for the undertaking much more than his salary and the upkeep of his laboratory. But it is essential, as Mr. Buckley so ably pointed out last year, that the chemist should be given proper status and recognition on the works. Moreover, he should be offered an adequate salary; and this applies to all technical staff men. Salaries should be proportional to training and ability, and such as will attract good men into the profession to "carry on." When the chemist has been appointed and equipped, he should be encouraged to carry out research and other original work, preferably in co-operation with the chemists of neighbouring undertakings. There is an immense amount of research which will have to be done in the near future; and in many cases it is only by actual experiments on the works that these problems can be solved. We have heard a lot recently about reorganization of the industry. I venture to think that one of the first steps must be the extended application of science to works' practice. It is up to us as juniors to get the best possible grasp of the theoretical and practical science underlying our work. It may be thought that I have digressed from the strict subject of the address; but I feel sure that you will agree that the one subject is closely bound-up with the other, and that a deficient application of science to works' management might more than neutralize any improvement to be brought about by what is known as "scientific management."

Mr. W. FLETCHER (Garston) said that there were one or two objects of the Manchester Welfare Committee which were rather good—especially the organizing of socials, competitions, sports, &c. These were desirable; and the results would more than repay the labour expended. At the Garston works, they had a bowling-green; and the men made great use of it. Those who did were in a better position to give good work in return. Regarding co-partnership, this with them had not been altogether a success. He thought, however, it would go better as time went on.

Mr. J. H. CROWTHER (Wallasey) said that they had a scheme in operation for apprentices; and among other concessions was that when attending night classes they were allowed until breakfast time next morning before turning into work. As the result of a first class at the

examination, they received an advance on their wages of 2s. per week; or 1s. per week for a second-class pass. They had tried to inaugurate a Domestic Committee, but had not been successful. It was looked on with too much suspicion. There was a lot of talk about educating the workers; and this was all right if it made them better citizens and better workmen. At Wallasey, they had a good stamp of employees; and out of about 150 men engaged on the works, there was only one time-loser.

Mr. JAMES B. STEWART (Rochdale) said there were one or two points in the address which he should like to criticize, but with a view to introducing practical suggestions. He referred to the shirker, and stated that the time taken in doing a job was set by the slowest worker. Suppose one increased the wages of the real worker or workers, and left the shirkers out, what happened was as follows. The shirkers brought the matter up at the next meeting of their union, and pleaded victimization, with the result that the union brought its influence to bear, and all the workers on the job had to receive the same remuneration, thus making it impossible to encourage in this way the better workman. The great difficulty to him seemed in getting men to think. The system of modern industrialism tended more and more towards specialization; and this took the initiative or creative power out of the workman, and made him merely a cog in the wheel. Their system of education was as much to blame as anything else for this state of affairs. The average youth had to cram as much as he could in the space of a few years to enable him to take his degrees—thus making the degree the end of his education, and not the means to an end, as it should be. Cramming of formulæ was no education in itself; the students needed to find out how these formulæ were arrived at. Then, on the practical side, how often did an apprentice to the engineering or kindred professions get a training in the broadest sense of the term? Very rarely, under present conditions of workshop practice. When they saw an intelligent man breaking away from preconceived ideas, they should endeavour to find out his reasons for the new departure. If one gas undertaking had a staff of thinking men, from the manager down to the lowest grade of worker, this undertaking, he was sure, would lead the gas industry. The whole question of efficiency in the industry depended upon the individual, and the way in which he was encouraged to perform his duties; and while he (the speaker) did not disparage theoretical training, he thought that the training should, as a general rule, be less concentrated and much more comprehensive.

Mr. J. BRIDGE (Bolton) agreed that a reconsideration of long-practised customs was necessary. Even during the war conditions several old customs had been altered, and new ones introduced. From some of these much information had been gained, conducive to the building up of efficiency. Scientific management of a benzol recovery plant not only produced the one aim sought for, but resulted also in the recovery of the troublesome naphthalene. The educating of the men engaged on such a plant resulted in better working, well repaying one for the time so spent. Organization in the true sense conduced to efficiency; but not carried out properly, it developed into "red tape," which was undoubtedly against efficient working. Personal contact with employees was advisable. With a tactful manager, it created better relationship, and often assisted in elucidating troubles.

The PRESIDENT (Mr. C. E. Teasdale) said that one critical point of the address which he would suggest should be carefully studied was: "A cry after the war will be improved efficiency, increased output, and to make the most of labour, materials, and equipment." Could they increase the efficiency of their departments, and how? The nearer they approximated to the full load on the plant, the less was the cost. They should use their labour to the best advantage, with due regard to human possibilities; obtain the maximum product from the raw materials, and avoid all waste; and modernize and use their equipment to the best advantage, with the minimum of wear and tear. Task-setting was a thing towards which all scientific management was directed—the attainment of the initiative of the workman through giving an extra reward for the successful completion of a task, which task had been determined by studying unit times. This end must be regarded as the initial incentive, and the moving force behind the entire development. Works Committees or Works Co-Ordination Committees were useful in discussing various questions with the management. Mr. A. E. Broadberry said in his Presidential Address to the Institution of Gas Engineers in 1917: "The maintenance and development of the gas industry must always be in the hands of the engineers and chemists, and must depend on them; but they should be backed in future much more by the administrators than they have been in the past." That is the help required by all enthusiastic juniors—he meant officials below the rank of engineer. First, the engineer must lend a sympathetic ear, and through him the administators must back the efforts of the understrapper. One of the main points was to make the most of the abilities of the juniors, to acknowledge their work, and to encourage suggestions. If any of the suggestions were good and worthy of trial, then let them be tried, and give full credit where credit was due. Carry this acknowledgment further by giving a salary worthy of the official's abilities and importance. Remuneration was a remarkable incentive to increased effort and enthusiasm. Nothing had been more damaging to the efficiency of the industry than the paltry way in which engineers and their assistants had been treated during the past four years—having to live on their pre-war salary, or at the most receiving a flimsy £50 war bonus. Was this the way to encourage officials to give of their best? The least they expected was an equivalent to the acknowledged increase in the cost of living. In working the plant under their control, they should know exactly what the plant was doing and was capable of doing. Hence, a record should be kept of its working, and the tests necessary to show its efficiency. Let them be efficient from the commencement, and carefully consider the future before adopting any design of plant. They should remember, in the design of plant, that the greater the number of working parts the greater the lubrication required, the greater the wear and tear, the greater the risk of breakdown, the greater the cost of upkeep, and often the greater the power required to drive. As Mr. Whitehead had shortly discussed chemical control, which everyone would agree was necessary to efficiency, so they must all study and decide for themselves the best means of attaining efficiency all round.

EXAMINING SPENT GAS PURIFICATION MASSES.

We are indebted to the "Journal of the Society of Chemical Industry" for the following abstract of an article by Herr A. Müller in the Chemiker Zeitung," Vol. XLII., p. 457.

The suggested conventional method of determining the sulphur and cyanogen (Prussian blue) in spent purification sludge from gas-works is open to criticism. In the determination of the sulphur, errors may easily result during the measuring of the carbon bisulphide solution; while there is no proof that the extraction of the sulphur is complete. In the author's experience, Drehschmidt's method of extraction (described in the "Journal für Gasbeleuchtung" as long ago as 1892) is much more trustworthy and rapid. The extraction crucible is a cylindrical porcelain vessel with a perforated bottom, upon which is placed a layer of glass-wool and a compact layer of asbestos. From 15 to 20 grms. of the sample are dried in the crucible at about 80° C., until constant in weight. The crucible is then introduced into the extraction apparatus, and the sulphur extracted with about 70 c.c. of carbon bisulphide. For the determination of Prussian blue, Feld's method is more rapid and accurate than Knublauch's method, based on the interaction of copper sulphate and potassium ferrocyanide: Two grms. of spent material are triturated in a mortar with 1 c.c. of ferrous sulphate solution (278 grms. per litre) and 5 c.c. of sodium hydroxide solution (320 grms. per litre), and after five minutes 30 c.c. magnesium chloride solution (610 grms. per litre) are slowly stirred-in, and the whole washed into a distillation flask with sufficient hot water to make up about 200 c.c. After about five minutes, 100 c.c. of boiling mercuric chloride solution (27·1 grms. per litre) are added to the boiling liquid, and the boiling continued for about ten minutes. The flask is then connected with the distillation apparatus, the receiver of which is charged with 20 c.c. of sodium hydroxide solution (80 grms. per litre); and after the introduction of 30 c.c. of dilute sulphuric acid (392 grms. per litre), the liquid is distilled for about twenty to thirty minutes. The distillate is made up to 250 c.c. (a trace of lead carbonate being added to remove any turbidity due to sulphur) and 100 c.c. are treated with 5 c.c. of potassium iodide solution (41·5 grms. per litre) and titrated with N/10 silver nitrate solution, 1 c.c. of which is equivalent to 0·009556 grm. of Prussian blue, $Fe_7(CN)_{12}$.

GAS BUBBLER FOR GAS ANALYSIS.

Writing in the "Chemical News," Mr. O. D. Burke says: In estimating sulphur dioxide in gases the general method is to pass the gases containing SO_2 to be estimated through a solution of either N/10 iodine or N/100 iodine. The apparatus employed is a flask or bottle connected to an aspirating bottle containing water, the displacement of which is the measure of the gas passed through the apparatus. The bottle containing the iodine solution is fitted with a narrow glass tube dipping into the iodine solution, or else a tube blown out at the end to a globular shape, and perforated with fine pin-holes, which tend to break up the gas stream into small bubbles. This method has serious drawbacks, especially in the hands of careless juniors, where gases which are to be estimated are under pressure. The chief cause of trouble is the tendency to rush the gas through the iodine solution too quickly for the interaction between the SO_2 and the iodine to be complete, with consequent erroneous results. Variation of as much as 1 p.ct. can be made quite easily by careless manipulation by two different juniors. To overcome this difficulty I had a bubbler made [see sketch], consisting of a narrow glass tube drawn out at one end into a very fine capillary, which is ground level at the point or end. Another glass limb is fused on to the straight limb, and extends downwards to just beneath capillary, where it is flattened-out and the top surface ground. The capillary is made to fit tight on the flat ground surface of the second limb. In this way the gas passing through the capillary tube is broken up into very fine bubbles no larger than a pin point; also the space is so restricted for the passage of the gas that no rushing through can take place, and the time interval for the passage of a certain volume of gas is identical in all cases—thereby, with just ordinary care, ensuring extreme accuracy.

Before the war nearly all the raw materials used for manufacturing nitrogen compounds were imported into Japan. In 1913 the imports of sulphate of ammonia aggregated 110,634 tons (as against 14,980 tons in 1917). The home production of sulphate of ammonia in 1913 was 7402 tons (as against 52,917 tons in 1917). In addition, there were produced in Manchuria 3462 tons of sulphate of ammonia in 1916, and 10,178 tons in 1917. Most of the numerous coke-ovens erected since 1914 are of the beehive type; but abundant ammonia should soon be available from the rapidly expanding coke industry in connection with iron smelting.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Benzol Extraction and Ill-Timed Letters to the Public Press.

SIR,—I am much interested in the resolution passed by the members of the Yorkshire Commercial Section. However much sympathy I have with it in this particular instance, I do not know that it would be good for the public generally if in all cases our Institutions considered that individual engineers should be barred in any way from using their influence in the formation of public opinion as to gas and its uses. It is still a free country; and men have a perfect right to their convictions, and to give expression to them in any way they see fit.

I need not remind you that all revolutions begin with one man, and not with a number of them. With most of us remains the taint due to the effect of collective action in connection with the gas equivalent of coal, and the evidence put before the Coal Controller in regard to it.

G. HELPS.

Nuneaton, Dec. 12, 1918.

Unalterable Air and Gas Adjustment.

SIR,—I have to acknowledge Mr. Thomas Hardie's kindness in supplying the information in his letter in the "JOURNAL" just to hand.

If there is trouble in Newcastle with the burners of the fixed adjustment class when the gas approaches 450 B.Th.U., this is perhaps an explanation why the South Metropolitan Gas Company did not wash their gas with oil; and perhaps, too, it provides us with one reason why the Chairman of that Company desired to see the yoke of pre-war standards put about the necks of his neighbours as quickly as possible, so as to maintain as closely as could be a level of conditions and of comparisons with the South Metropolitan Gas Company, and thus deprive the neighbours of a commercial advantage, which will also benefit the consumers. Anxiety on the part of Mr. Carpenter, D.Sc., over the consumers of the Gas Light and Coke Company and of the Commercial Gas Company does not appeal to many people as the only cause for pleading through the London newspapers for a reimposition of the standards; any more than does the phylactery of "An Official of a Metropolitan Company,"

One Metropolitan Company has supplied gas of pre-war quality all along

explain that, while the Company hinted at only tar-washed their gas (other than to what was tantamount to an experimental extent with oil) the other companies were oil-washing their gas, so supplying the nation with a larger quantity of benzol and toluol per ton of coal.

I am gratified, as many others will be, to see the resolution passed by the Yorkshire Commercial Section, as given in Mr. Baillie's letter in the same column as the one by Mr. Hardie.

A SATISFIED USER OF OIL-WASHED GAS.

Dec. 11, 1918.

Stripped Gas.——Pressure and Unaccounted-for Gas.

SIR,—The remark quoted from a paper read by Mr. M'Nab nearly nine years ago, on the Sale of Gas Act, 1859 [see *ante*, pp. 571-2], is of such a casual character that it was not noticed in the subsequent discussion. It can scarcely be recognized as a specific warning against the effects of stripping gas, much less as anticipating any of the details set forth in the report of the "Life of Meters Research Committee," or in Mr. Parkinson's paper on "Unaccounted-for Gas." Therefore, it does not in any sense weaken the position indicated in my article, "What is the Truth about Stripped Gas?" No doubt some of the information now put in shape before the profession was known to meter-makers and others in a general way; but I have yet to learn that any similar investigations had been previously published; that the matter was adequately treated in discussions on the pros and cons of stripping gas; or that any remedy was suggested.

Now for my second subject. In the course of his address to the Manchester Junior Gas Association [see *ante*, p. 569], Mr. Garsed states that "leakage is proportionate to the square of the pressure." According to experiments conducted in California [see "JOURNAL," Vol. CXLI., p. 293], this rule merely holds good for uncovered or naked piping, and does not apply to pipes buried under 2 ft. or so of earth. A piece of pipe was tested (*a*) when freely exposed, and (*b*) when buried under 2 ft. of well-rammed earth. The loss in the second case was merely a fraction of that observed in the first.

NORTON H. HUMPHRYS.

Salisbury, Dec. 11, 1918.

The Home Supply of Benzol.

SIR,—Mr. D. Bagley, in your issue of Dec. 10, asks me and others to give a specification for motor benzol.

In my opinion, the matter is best left in the hands of a Committee of Experts. Such Committee could command the assistance of all interested in the matter.

The new National Benzol Association has a unique opportunity of calling together a Committee of this description, as one of the principal objects of the Association is "to standardize motor benzol, and to carry on, assist, and promote investigation and research with a view to its improvement."

As the matter is of national importance, I suggest that the names of the members of the Committee, and any recommendations it may make, be published before even a provisional standard is fixed.

It is an open secret that a provisional standard has been privately circulated, which will, if accepted, in my opinion, prove unsatisfactory in competition with petrol.

M. WYNTER BLYTH.

The Laboratories, Thorncliffe, near Sheffield, Dec. 13, 1918.

REGISTER OF PATENTS.

Converting an Engine into a Coal-Gas Compressor. No. 120,622.

MURPHY, S. J., of Drogheda, Ireland.

No. 16,743; Nov. 14, 1917.

The means suggested by the patentee for converting an engine into a compressor for coal gas or other fluid comprise a high-pressure cylinder attached to the ordinary cylinder, forming a continuation of the latter with reduced diameter, and a plunger mounted on the ordinary piston, and adapted to produce compression in the high-pressure cylinder. The coal gas is admitted into the latter through a port or valve either in the cylinder wall or in the plunger when made hollow, in which case the plunger also has a port or valve for the admission into it of the coal gas previous to its escape therefrom into the high-pressure cylinder. There is also a non-return valve in the cylinder through which the compressed air or gas is delivered into any suitable vessel. The plunger is fitted with a non-return valve upon its head and ports in its wall; the head of the plunger carrying packing rings, with some clearance behind them for air or gas to pass into the plunger from the ordinary cylinder—the latter having an inlet port furnished with a non-return valve.

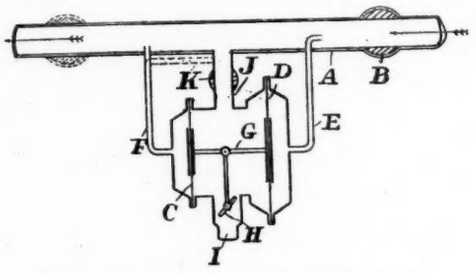
Controlling the Supply of Combustible Mixture. No. 120,679.

KEITH, J. & G., of Farringdon Avenue, E.C., and

WHATMOUGH, W. A., of North Finchley, N.

No. 2215; Feb. 7, 1918.

This invention relates to means for controlling the supply of combustible mixture to internal combustion engines, irrespective of the speed of the engine and of varying atmospheric pressure.



Keith and Whatmough's Gas Supply Controller.

In one of the three embodiments diagrammatically shown in the specification there is connected with the induction pipe A—intermediate the engine and a throttle B fitted to the pipe—a governor device, comprising two diaphragms C D within a chamber. The diaphragms are of different size; the one furthest from the engine being twice the effective area of the other one. From the back of the diaphragm D a Pitot tube E is led to the induction pipe; the termination of the tube facing upstream towards the air current flowing through the induction pipe; while from the back of the diaphragm C a Pitot tube F is led to the induction pipe at a point nearer the engine than the first—the termination of the tube preferably facing downstream. The diaphragms are connected by a rod G having an operative connection with a valve—fitted to a pipe I serving to control the admission of gas to the space between the diaphragms. A pipe connection J, fitted with an obturator K, is taken to the induction pipe at a point intermediate the terminations of the Pitot tubes, and affording means of adjusting the quality of the mixture.

With the arrangement described, the difference of pressure established across the obturator by means of the governor will be approximately twice the difference of pressure between the two Pitot tubes; so that the effect of mechanical lag or reluctance of the governor on this difference of pressure across the obturator will be approximately halved. The ratio named for the relative areas of the diaphragms is optional; it being necessary only that there be a sufficient difference between the areas to ensure satisfactory operation in all circumstances.

If desired, as shown in dotted lines, the second Pitot tube may be led to the pipe connection J. An alternative disposition of the throttle nearer the engine than the Pitot tubes is also shown.

Distillation and Recovery of Ammonia. No. 120,596.

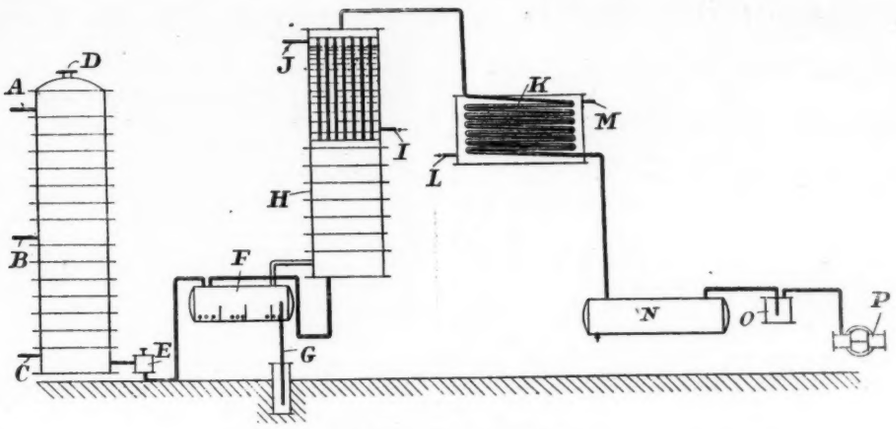
WILTON, G., of Mill Hill, N.W.

No. 14,745; Oct. 11, 1917.

In this apparatus for the distillation and recovery of ammonia from liquor containing very small quantities of ammonia, the hot spent liquor from the stills is subjected to partial vacuum, "whereby the ammonia in the liquor is evolved with or without the assistance of waste or other additional heat."

The illustration shows diagrammatically the apparatus referred to.

The still employed is of the usual construction. The liquor entering at A is distilled in contact with milk of lime admitted at B by a counter-current of steam admitted at C—D being the ammonia outlet. The still shown would be the last of a series if more than one still were used. The spent liquor which leaves the bottom of the still hot and



Wilton's Ammonia Recovery Plant.

under a slightly increased pressure—say, about 3 or 4 lbs. above atmospheric—is led by a pipe, controlled by an intermittently operating automatic valve E, to a receiver F, in which a partial vacuum is maintained. On entering the receiver, ammonia will be boiled off from the hot liquor under the reduced pressure. The boiling may be assisted by heating coils supplied by exhaust steam. There are deflector plates in the receiver, to cause the liquor to take a sinuous course therein. G is the waste pipe for the spent liquor from the receiver—discharging into a trap outlet.

From the upper part of the receiver the liberated ammonia vapours, together with the steam evolved, pass to the bottom of a reflux condenser and concentrator H. The upper part of it contains a number of condenser tubes fitted between tube plates and cooled by cold water admitted at I to the space around the tubes and passing off at J. The lower part of the condenser consists of superposed bubbling trays and hoods similar to those of a fractionating column, the vapours bubbling up under hoods through the liquor in these trays in succession, and the condensed liquid descending from tray to tray by a series of overflow pipes. Surplus condensed liquid can be led back to the receiver F by a trapped pipe.

The vapours passing on from the top of the condenser are led to a coil condenser K, cooled by water admitted at L, with M as the outlet. The condensed liquor (which represents a more concentrated ammonia liquor than that leaving the liquor stills, and is suitable for commercial purposes) passes on to a collecting receiver N, and thence, through an ammonia trap O, to a vacuum pump P. This pump draws the vapours through the apparatus and assists in maintaining the desired vacuum in the receiver F.

If less steam than usual is employed in the stills, a correspondingly increased percentage of free ammonia may be retained in the spent liquor and a larger yield of concentrated ammonia liquor be obtained as the result of the vacuum and cooling treatment. The patentee states that less steam by about 50 or 60 p.ct. than usual may be passed through the stills. The ammonia in the spent liquor from the liquor still, it is claimed, is pure as compared with the ammonia passing off from the still which (as is known) is contaminated with sulphuretted hydrogen, carbonic acid, cyanogen, and other impurities, "so that ammonia liquor obtainable by the present invention presents a corresponding advantage."

Scrubbers, Cleansers, and Coolers for Gas. No. 120,684.

SMITH, D. J., of Finsbury Park, N.
No. 2832 of 1918; dated Oct. 18, 1917.

This invention relates to devices used to cool, cleanse, or scrub gases, and particularly to devices used in connection with gas producers, either suction or pressure operated—the gases being thus either drawn or forced through the scrubber. The objects aimed at are: (1) To reduce the size and weight of the scrubber; (2) to reduce the resistance by friction or back-pressure on the gases passing through the scrubber; and (3) to render the apparatus suitable, among other purposes, for use on motor vehicles propelled by internal combustion engines operated by suction gas.

The scrubber consists of a vertical cylinder, having fitted therein a smaller cylinder secured at the bottom of the larger cylinder concentrically, and projecting upwardly nearly to the top cover. The annular space between the cylinders is fitted with ring discs (preferably of sheet metal) forming interrupted paths extending to within a short distance from the bottom of the main cylinder. The gas is caused to enter from the producer at the side of the main cylinder and to traverse the interrupted paths. Water fed by a pump flows into the top of the main cylinder; and runs down the paths, meeting the ascending gas on its way, so that it is cooled and washed. The water passes to the bottom of the main cylinder and leaves the scrubber preferably through the same pipe by which the gas enters. The gas, on reaching the top of the main cylinder, passes down the smaller inner concentric cylinder, which is filled nearly to the top with pieces of coke, through which the gas is caused to pass. Means are provided to prevent any portions of coke, &c., which may become detached from being drawn into the gas outlet pipe; and provision is made for draining both the larger and smaller cylinders when necessary. The coke is held in a wire basket, so that it can be withdrawn by taking the cover off the main cylinder for cleaning or renewal. By this means the quantity of coke is said to be reduced to a minimum, and the gas leaves the scrubber much drier than when passed through a scrubber of the ordinary design. There is also much less frictional resistance to the flow of the gas. The pump or water supply to the scrubber is controlled either by the engine using the gas or by a fan forcing gas through the scrubber, so that the water supply is mechanically controlled and in proportion to the quantity of gas passing through the scrubber.

The size of the scrubber, as also the weight, is in this way reduced to a minimum, which renders it "suitable for use on automobiles, or for other vehicle purposes where the working conditions are liable to fluctuate rapidly."

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Dec. 11.]

Nos. 19,843—20,385.

CHRYSTAL, W. J.—"Producer gas plants." No. 19,940.
CLERC, C.—"Gas-generators." No. 20,098.
DAVIS, G. W.—"Incandescent burners." No. 20,071.
DEMPSTER & SONS, R.—"Track switches." No. 20,158.
EICHENBERGER, P. K.—"Gas-stoves." No. 20,065.
GLOVER, R. B. & S.—"Valves for gas, &c., meters." No. 20,195.
HALPIN, J. A.—"Needle-regulating valves." No. 20,346.
KENT, W. G.—"Liquid meters." No. 20,286.
KESTNER EVAPORATOR AND ENGINEERING COMPANY.—"Apparatus for cooling gases." No. 20,044.
LEA, J. W.—"Incandescent mantle carriers." No. 19,951.
MANTLE LAMP COMPANY.—"Burners." No. 20,071.
MARTIN, F.—See Kent. No. 20,286.
MURPHY, J. J.—"Manufacture of fuel from coke, &c." No. 20,225.
REAVELL, J. A.—"Apparatus for cooling gases." No. 20,040.
SHERRATT, J. T.—"Cock or valve." No. 20,260.
STEWART, J.—"Gas carburettors." No. 20,314.
THOMAS, H. J. S.—"Meter-recorder." No. 20,124.
THORP, F. & H. T.—"Gas-burners for cooking, &c." No. 20,196.
UMSTED, F. A.—"Manufacturing gas and obtaining bye-products therefrom." No. 20,002.

LEGAL INTELLIGENCE.

A Libel Action Withdrawn.

During the holding of the recent West Riding Assizes at Leeds, application was made for the withdrawal of an action for libel entered by Mr. Arthur Docking, engineer, of London, against Mr. E. Bernardy, engineer, of Bradford. Mr. W. J. Waugh, K.C., stated that serious statements had been made affecting the plaintiff as an engineer; but the defendant now withdrew the whole of these statements, and expressed regret for having made them. His client had only entered the action to clear his character; and the question of damages would not be pressed. They asked that judgment should be entered for the plaintiff for the costs of the claim and the counter-claim. On behalf of the defendant, Mr. Tindal Atkinson, K.C., concurred; and his Lordship (Mr. Justice Salter) entered judgment accordingly, remarking that the settlement was a very proper and reasonable one. [Mr. Docking, who is Chief Engineer to Messrs. Sharp and Preston, Ltd., is known to "JOURNAL" readers in connection with his patent gas and air apparatus.]

Responsibility for Damage to Public Lamps.

It will be remembered that a few weeks ago [*ante*, p. 380] the Wakefield Gaslight Company sought to recover £5 from Messrs. Joseph Sykes & Sons, colliery agents, of Slaithwaite, part cost of replacing a lamp in Northgate, accidentally knocked down by a motor wagon belonging to the defendants. The summons was taken out under section 20 of the Gas-Works Clauses Act; and the Solicitor appearing for the defendants admitted the damage, but claimed that under the Act only the person actually responsible for the damage was liable. The Mayor said that the Bench had no alternative but to dismiss the case; remarking: "We are here to administer the law. We are not here to administer common sense, apparently." Since then the Company have made a claim on the driver of the wagon; and this has been settled by the Solicitor who appeared at Court on behalf of Messrs. Sykes, for the sum of £5, which is the amount recoverable under the Gas-Works Clauses Act.

MISCELLANEOUS NEWS.

REPORT OF THE LOCAL GOVERNMENT BOARD.

The forty-seventh annual report of the Local Government Board—which is for the year 1917-18—is, like its immediate predecessors, of very moderate dimensions; there having again been excluded from the various parts into which it is divided much matter relating to the normal activities of the Department, together with most of the tables and statistics.

Allusion is made to the report of Mr. W. S. Curphey, the Chief Inspector under the Alkali, &c., Works Regulation Act, for the year 1917, which has already been fully dealt with in the pages of the "JOURNAL." It is pointed out that further aspects of the direct process of sulphate-making in gas-works were considered during the year, and are discussed at some length in the report; and that the continued erection of tar dehydrating plants in gas-works has led to another marked increase in the number of tar-works registered. As to industrial scientific control, Mr. Curphey stated that recently there has been a considerable extension in the numbers of those who recognize the advantages to be derived from the most efficient works control, and that progress is also evident in favour of co-operative effort, though not always accompanied by the desire to add special knowledge to the general store.

During the twelve months to which the report relates, the Board, of course, continued the policy of endeavouring to secure the postponement by local authorities of all works except such as were of pressing necessity. In the case of expenditure on works which had not been commenced, the greater part of the loans sanctioned during the year was for purposes connected with the production of munitions of war—such as the extension of gas-works and plant, and electrical apparatus and cables. The total loans sanctioned to local authorities amounted to £2,134,911—compared with £2,721,475 the previous year.

There were issued 34 Orders under the Special Acts (Extension of Time) Act, 1915, extending the time limit for the exercise of powers by authorities under Local Acts and Provisional Orders. In the preceding report, it was intimated that, to assist them in dealing with problems likely to arise in the distribution of labour and employment, the Board were compiling a register of works to be executed after the war. To this end, a circular was issued asking for information as to works which might be undertaken; but up to the time of preparation of the present report, a large number of the 2675 local authorities to whom the circular was addressed had not sent in returns.

Note is made of the further Orders issued under the Gas (Standard of Calorific Power) Act, 1916—namely, upon the application of the Town Councils of Birkenhead, Birmingham, Blackpool, Bolton, Salford, Southport, Stourbridge, and West Bromwich, and the Urban District Councils of Bingley and Shipley. The Orders [as mentioned in the "JOURNAL" from time to time] have prescribed a standard of calorific power of 500 B.Th.U., and a pressure of not less than 15-10ths. It was ascertained before making the Orders that the local authorities concerned had taken such action as was contemplated by the Act for the production of benzol and toluol.

A very great deal of the time of the officials was naturally taken up with special work arising out of the war; and an indication of the scope of this work is to be found in the report. There was a certain amount of general legislation during the year, but none of a character which calls for special mention here. As soon as conditions allow of their being freely carried out, housing and town-planning schemes promise to keep the Local Government Board busy for some time.

LONDON COUNTY COUNCIL AND CALORIFIC POWER AND INERTS.

Among the matters to be submitted at to-day's meeting of the London County Council is a report of the Public Control Committee (signed by the Chairman, Mr. A. L. Leon) which opens with the following references to calorific power and inerts in connection with the gas supply:

The Council is charged with certain powers of supervision over the gas supplied in London by the three principal Metropolitan Gas Companies—*i.e.*, the Gas Light and Coke Company, the Commercial Gas Company, and the South Metropolitan Gas Company; and these Companies are required to conform to specified standards of illumination or calorific power. The calorific standard is 540 B.Th.U. gross, and the standard of illumination 14 candles. The first-named Company is subject to the calorific standard, and the other two to the illuminating power standard.

During the war gas companies have rendered valuable services to the Government by supplying benzol and toluol, &c., for use in the manufacture of explosives. To a very large extent these compounds have been extracted from manufactured coal gas; and owing to their high illuminating and calorific values, the power of gas as supplied to consumers has naturally been affected. Hitherto we have abstained from submitting to the Council any reports on the quality of the London gas supply, as we assumed that it would not be the Council's wish in any way to embarrass the Companies in the discharge of an important national service.

The prospect of peace has somewhat changed the position; and we accordingly submit some particulars as to the supply of gas during the war, and also as to the quality of gas which may be supplied in the immediate future. In addition to making statutory testings for determining illuminating and calorific power, we thought it desirable to make other tests in order to ascertain whether the gas was affected in any way other than by depreciation due to the extraction of the benzols. Accordingly, analyses of gas, which had formerly been made only occasionally, were carried out with some degree of regularity. Two processes are employed by gas companies in the extraction of the benzol vapours present in coal gas—one being known as tar washing, and the other as oil washing. In both processes benzol is arrested, and is afterwards recovered from the tar or oil by distillation. Tar washing reduces the calorific value of the gas by about 2 p.ct. Oil washing, however, strips the gas of the benzols more thoroughly, and in practice reduces the calorific, or heating, value by about 5 p.ct.

The special examination, to which reference is made above, of the composition of gas showed that, in the case of the Gas Light and Coke Company and the Commercial Gas Company, in addition to the depreciation resulting from debenzolizing operations, the power of the gas was further lowered by the introduction of an increased proportion of "incombustibles" or inert gases than had obtained previously. In our opinion, this was not due to difficulties arising out of the war or to the services rendered to the Ministry of Munitions, but to causes which seem to us easily preventable. Nevertheless, we thought it desirable in the national interest to avoid taking any action which would have made the matter public. The occasions on which the gas fell below the point at which a liability to penalty arises were numerous. But the presence of an excessive quantity of incombustibles would equally affect both high and low returns; and incombustibles have not yet been regarded by Parliament as a standard for determining the value of gas. Although we were satisfied that the power of the gas was generally lowered by these conditions, we could hardly urge that any particular deficiency was wholly caused thereby. Representations on the subject were made from time to time to the Companies, and we also had interviews with representatives of the Gas Light and Coke Company. We paid every consideration to the Companies' explanations as to the special difficulties under which they were labouring; but we were not able to modify the view expressed above. As far as we could judge, the proportion of inerts in the gas of the South Metropolitan Gas Company remained fairly constant; and this Company continued to supply its consumers with a gas which practically complied with statutory requirements. During the whole period of the war the gas of this Company has only fallen below the penalty limit on 24 occasions out of 6165 testings, and has throughout been of an average calorific value of 555 B.Th.U. The South Metropolitan Gas Company has mainly tar washed its gas; whereas the other Companies have used the method of oil washing. In 1916-17, however, the average calorific power of the gas of the Gas Light and Coke Company fell to 500 B.Th.U., and that of the Commercial Company was only slightly higher. From January to June, 1918, it was in each case about 490 B.Th.U., and from July to October a little over 470 B.Th.U. In the middle of the present year, the position was somewhat modified. On June 28, 1918, the Ministry of Munitions made an Order imposing conditions of manufacture on gas companies. Under this Order the large Metropolitan Gas Companies are required so to work their plants as to produce gas of a calorific power of as nearly as possible, but not less than, 500 B.Th.U. gross before washing the gas for the extraction of ammonia, toluol, and benzol. In gas-works in which water-gas plant is installed—as in the cases of the Gas Light and Coke Company and the Commercial Gas Company—coal gas of a higher calorific value may be produced and mixed with uncarburetted water gas (which has a calorific power of about 300 B.Th.U.), but only in such quantities that the mixed gas shall be of the calorific value stated above. The Order further requires that the calorific value of the mixed gas as actually delivered to the consumers shall under no circumstances fall below 450 B.Th.U. The Order places a limitation on the use of oil for enriching water gas; but its important feature so far as the Council is concerned is the fixing of 450 B.Th.U. gross as the point at which liability to penalty for deficient power arises. The Order may be regarded as an expedient for meeting the purposes of the Ministry with regard to supplies of benzol, &c., and also for assisting the Coal Controller in promoting economy in the consumption of coal and oil.

With the cessation of hostilities, gas companies are being relieved of the requirement to debenzolize the gas for war purposes. We are, accordingly, considering what steps can be taken, consistent with the national interest, to secure for the benefit of consumers a return to pre-war conditions as regards the heating value of the gas supplied by the large London Gas Companies.

PEAT-COKE AND OIL SYNDICATE, LTD.

At the annual meeting of the Peat-Coke and Oil Syndicate, Ltd., which was held in London last Thursday week, the Chairman (Mr. J. W. Leadbeater) said the Syndicate was established essentially in order to develop by practical experiment the process of producing, from peat as a base, a thoroughly good coke or smokeless fuel, with valuable bye-products recovered in the process of distillation. This had been thoroughly successful, and a process patented (of which the Syndicate possessed the sole rights) by which ordinary gas plants could be adapted for the conversion of peat into smokeless fuel for commercial and domestic use, and the recovery of bye-products—motor spirit, light and heavy oils, sulphate of ammonia, acetate of lime, acetic acid, &c. A further product, which promised to be of high commercial value, was the decolorizing agent which they were able to produce as a bye-product of peat. One complete gas plant has been adapted to our process, and was in operation on the production of a smokeless fuel and bye-products. This plant was obtained largely through the good offices of the Ministry of Munitions. Tentative arrangements had also been made for the rapid extension of fuel production under their process by bringing into active operation other plants with as little delay as possible, when working capital was available for the purpose. Shareholders had asked what inducement gas companies had to adopt the process. The advantages they obtained were a richer gas and a better coke, at less cost; so that with the same charges they could obtain a higher revenue return. But gas engineers would realize that low temperature carbonization cannot be adopted by gas companies except as a side line—and it would be a profitable side line. Spare beds of retorts could be adapted to the process at very little cost. This was a matter for future development.

The present position was that they were actually renting spare plant at two gas-works, and had offers of spare plant at others, including some of the largest gas-works in Yorkshire. What they were going for at the moment was the utilization of plants which were lying idle all over the country, or could be spared—not because of fuel shortage due to the war, but because they were stand-by plants. To secure the best results in distillation, they ought to have special retorts; but as yet they had simply utilized the best plant they could get. It was, however, not a material matter, because it was doubtful whether the improvement in the output arising from special retorts would be worth the cost of erection. By their process they could arrange the temperature in the retorts at whatever they desired. The light oils came off in the tar, and were extracted afterwards. The peat they were using was very low in sulphur content.

COAL SHORTAGE AND LABOUR TROUBLES.

Serious Outlook at Widnes.

Widnes, with a reputation for the cheapest gas in the world, has suffered from a serious shortage, and is in peril in the coming holiday season of being altogether without gas. The United Alkali Company, with commendable public spirit, are helping, by sending expert furnacemen to supplement the depleted Corporation staff. The situation was discussed at the Town Council meeting last Tuesday.

Alderman Timmis (the Chairman of the Gas and Water Committee) said he would like to tell them something in regard to the very serious position at the gas-works, and to give the Council some information as to the cause of the trouble. They had experienced a shortage of light; and he was sorry to say the position was still bad. With the holidays in front of them, he was afraid it would be more serious. The Committee were making every endeavour to meet the difficulties; but he was not sure whether they would be able to overcome them. Widnes might have to suffer some inconvenience during the holidays. His report was that many people had hardly had any light during the week-end, and that some gas-engines had not been able to work. The supply would most likely have given out, had they not been most generously aided by the United Alkali Company, who (through Mr. Smith, a member of the Council, and Mr. Williams, of the Sullivan works) sent men to fire the retorts—a public-spirited action for which their thanks were due. The first cause of the trouble was a shortage of coal, and the inferior quality of the fuel they sometimes got. On the previous day, they had received only four wagons of coal, and they had in stock 400 tons, which was two-and-a-half days' supply. Their contractors were 614 wagons behind in deliveries; but through the efforts of the Coal Controller for the district, they had received from other sources 400 wagons against this shortage. The coal was of an inferior quality, and not suitable for gas making, and had therefore entailed extra labour. They were altogether short of 1100 tons of coal since last October. The Engineer (Mr. Isaac Carr) was at that moment in Manchester meeting the Coal Controller; and he trusted his efforts would be successful. As to labour, they had eleven gas stokers; but owing to influenza, ordinary sickness, and accidents, they had only eight and nine, and sometimes six, men working. The staff themselves had actually done stoking, which was, of course, not their duty. The only men they had left capable of putting the public lights in order had been taken away to fire at Stocks Well, for after all the water supply was more essential than street lighting. The Engineer had been ceaseless in his activities, and certainly sleepless for some time. During the war, the sulphate of ammonia plant had been stopped, the liquor being required by the Government; but after the armistice, it was no longer needed. The sulphate plant should be put in order now. Fortunately, they had a large amount of storage for the liquor. But this week it would be exhausted; and unless they could get competent men from somewhere the liquor would run away. From the Labour Exchange they had received fourteen men; but three only remained. At the present time there were at least sixty houses without gas, because fittings, connections, or something had gone wrong; and there was not a single man to remedy the defects. He therefore asked the public to be patient, and bear cheerfully any discomforts.

After some discussion, the Mayor suggested the sending of a telegram, which might strengthen the appeal of the Engineer; and this was agreed to.

Cheltenham Gas Supply Threatened.

The extreme difficulty experienced in obtaining coal has forced Mr. James Paterson, the Engineer and General Manager of the Cheltenham Gas Company, to intimate to the consumers, on behalf of the Directors, their fear that it may shortly become necessary to cut off the supply of gas during certain hours of the day. Users of gas are asked to exercise the utmost economy; and the advisability is pointed out of householders burning coke (of which there is an ample stock at the gas-works) as far as practicable in place of coal.

Economy Needed at Lisburn.

At a meeting of the Lisburn Urban District Council, it was stated, as showing the difficulty in working the gas undertaking just now, that the stock of coal at the gas-works was 615 tons, against 1720 tons at the corresponding date last year. In the circumstances, it was decided to ask consumers to exercise the strictest economy.

MAIN D. S. O. FIRES

FOR FUEL ECONOMY.

HYGIENIC AND EFFICIENT.

Made in 55 sizes with a pleasing variety of designs.

Component parts are interchangeable, with Burners reversible, throughout each series.

Special Prices. . . . . Write for latest List.

ORDER NOW WHILE MATERIAL IS AVAILABLE.

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N. 18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOWROOMS and BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

NELSON AND BRIERFIELD WITHOUT GAS.

Sequel to a Sympathetic Strike.

A strike of gas workers employed by the Nelson Corporation, in sympathy with a number of outdoor workmen until recently in the service of the Brierfield District Council, who left work owing to a wages dispute in September, commenced last Wednesday night.

The day-men at the Nelson and Brierfield Gas-Works left their employment at 5.30 p.m., and the remainder followed on the completion of their shifts; both works being brought to a standstill by 6.30 on Thursday morning. About eighty men were affected. Since last March, the whole of the gas supply for the Nelson area, which includes Brierfield and Barrowford, has been manufactured at the Brierfield works. No street-lamps were lit on Thursday night, and there was no lighting-up at the mills. The Nelson Corporation, between whom and their employees there is no dispute, have reported the circumstances to the Minister of Labour.

BURNLEY GAS-WORKS EXTENSIONS.

Corporation to Apply for a Provisional Order.

Now that the war is over, the Burnley Corporation are to proceed with the proposed new works. The matter came forward at a special meeting of the Town Council last Thursday afternoon, when Alderman H. Emmott, J.P. (the Chairman of the Gas Committee), presented a report in which he gave particulars of the requisite purchases of land, and then proceeded:

The necessity for increased gas-holding capacity may be gathered from the fact that the capacity for the production of gas at present at the existing works is: Coal gas, 3,000,000 c.ft. per day; carburetted water gas, 1,500,000 c.ft. This assumes that everything is in perfect condition at the works. In order to secure safety, a margin of 20 p.ct. ought to be deducted. The maximum amount of gas sent out in one day is 3,909,000 c.ft.; and the storage capacity at a gas-works should amount at least to the maximum daily output. The total capacity of the present holders is 2,600,000 c.ft., or only 65 p.ct. of the maximum daily demand. The Gas Engineer (Mr. J. P. Leather) is of opinion that an additional holder of a capacity of not less than 3,000,000 c.ft. should be erected as early as possible.

The cost of the purchase of the land and of works accessory thereto, and of the legal charges, will amount to about £10,000, without including the cost of constructing a necessary culvert, of street works, or of forming and making an approach road and erecting permanent fence walls around the land to be purchased. Some of these items of expenditure will not be incurred for a number of years to come. It will be possible in the next session of Parliament to obtain a Provisional Order to empower the Corporation to manufacture and store gas upon the land; and this course the Gas Committee have considered it advisable to take—subject to the approval of the Council.

The Council accordingly passed a resolution: That application be made to the Local Government Board for a Provisional Order under the Public Health Act, 1875, partially to repeal, alter, or amend the Burnley Borough Improvement Act, 1871, and the Burnley Corporation Act, 1889, so as to empower the Council to purchase by agreement and to use for the purpose of their gas undertaking land described, and to borrow money for the purpose.

Alderman Emmott pointed out that after they had got the land they would go in for borrowing powers for £80,000 for the new holder, &c. New works would be constructed on the site, and eventually the whole of the old works would be removed. This would enable them to make gas cheaper, as the works would be easy of access from the canal and railway, which the present works were not.

SCIENCE AND INDUSTRY.

An Address by Sir William S. M'Cormick.

There was a large audience at the Saddlers' Hall, Cheapside, last Wednesday afternoon, to hear an address, which was delivered under the auspices of the Industrial Reconstruction Council, by Sir William S. M'Cormick (of the Department of Industrial and Scientific Research), on the subject of "Science and Industry."

In opening his address, Sir William remarked that he had been asked to say something about the relations of science to industry. He was not going to trouble his audience with any diatribe about the delinquencies of the past. His own personal opinion was that these had been somewhat exaggerated in certain quarters. What he wished to do was to give some attention to the question of what was the machinery or organization by which the closer union of science and industry could best be brought about. An answer had recently been given to this question by the Government, in the scheme for the institution of Trade Research Associations within each industry, which had been published under the auspices of the Department of Scientific and Industrial Research. The outbreak of the war had brought them to a somewhat sudden realization of certain defects in their industrial and scientific organization; and within a year of the commencement of hostilities, the Government had decided to consider the problem. He explained in some detail the method in which the subject had been dealt with—the constitution of the Committee set up, the matters they had to discuss, and the work they had to perform. The scheme, he said, was one for which the Advisory Council (of which he was

USE Simmance's

DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.

Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

Chairman) were responsible; but at every step and stage in the building-up of this scheme they were not only in intimate communication with representatives of most of the industries of the nation, but in collaboration with them.

The scheme was an entirely voluntary one. The principles underlying the proposals were two—that the organization of industrial research for any industry, if it was to be vitally effective, must be for the industry as a whole; and that it must be conducted, directed, and financially controlled by the industry itself. Most large firms already had research laboratories connected with their factories; and these were doing a good deal in testing the products, improving existing processes, removing difficulties, and avoiding waste; and the Advisory Council had on many occasions in the past three years assisted trade researches of this kind. But they had not hidden from themselves the fact that, after all, these really went but a very little way. An industry would not be saved by attacking problems in this manner; it would not be saved merely by improving its existing machinery and processes. Research, as they had to understand it in the future, was not a simple problem, but a most complex one. They must advance upon a broad line—which took time, in which progress was slow, in which there were many difficulties, repulses, and failures, which needed patience and perseverance, and which, above all, was very costly. Most of the industrial corporations of the United States were spending from £10,000 to even £100,000 a year; and this did not include capital expenditure on laboratories, but merely research relating to a particular industry. Instead of large trusts, of course, there were smaller units in this country; and that being the case, they would have to combine for the purposes of research. The expenditure required for the systematic, comprehensive, and continuous research work which must be the life-blood of our industry in the future, could not be undertaken by any individual firm; and therefore it must be done for the industry as a whole. The scheme proposed would not interfere with the initiative and individual prosperity of the firms that might join it. The second principle of the scheme was that researches must be organized and controlled, and must as far as possible be financed, by the industry itself. To this end, it was proposed that associations of firms in each industry should be formed under section 20 of the Companies Act, without profits, and having a governing council or board representative of all the constituent sections of the industry, and a Director of Research, who would prepare a plan of procedure for their consideration and co-ordinate the various activities.

In the progress that they hoped for, there were going to be quite grave difficulties and risks. There was no advance in industry that could take place without certain results that caused trouble. They must prepare for this possibility by taking labour into their confidence, acting together in common council, and planning how best to meet the circumstances. Every improvement in machinery, every cheapening of cost, was in the interest of labour; and they must let them see that it was in their interest. His experience had been that misunderstanding, mistrust, and suspicion were the children of ignorance, which, by sharing their difficulties, could be dissipated entirely. It was by the union of labour, science, management, and capital, and carefully keeping each within its own function, that they would solve the question.

The Inland Revenue Commissioners had consented to regard subscriptions to such research associations as business costs of the firms who joined them. Another concession that they had secured was that the income of these associations would not be subject to income-tax. Though most of the associations must in the end be self-supporting, the Council had urged the Chancellor of the Exchequer to give them a fund so as to launch the associations on their way for (say) the first five years; and a trust had been set up by which they had been presented with £1,000,000 sterling. His personal belief was that the scheme would work. About a dozen of the old national industries had already adopted it; and some twenty others were engaged in preparations for adopting it. But it would only work if it had the power behind it. He felt confident they were going to get this motive power.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 16.

Pitch continues very firm at not below 65s. per ton net f.o.b. makers' works. There is a large amount of inquiry for the article, and makers are very comfortable. Inquiry for benzol is very brisk; the price for resale being 2s. 7d. per gallon net. Other tar spirits remain unchanged. There is plenty of inquiry for creosote, although this article is still under the control of the Ministry of Munitions.

Deliveries of sulphate of ammonia are proceeding regularly; all available supplies being taken up.

Tar Products in the Provinces.

Dec. 16.

The average values for gas-works products during the week were: Gas-works coal tar, 31s. to 36s. Pitch, East Coast, 44s. to 45s. per ton; West Coast—Manchester 35s. to 40s., Liverpool 35s. to 40s., Clyde 35s. to 40s. nominal. Benzol 90 p.ct., North, 1s. 10d. to 1s. 11d.; 50-90 p.ct., naked, North, 1s. 7d. to 1s. 8d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha in bulk, North, 7¾d. to 8¼d. Solvent Naphtha, naked, North, 2s. 10d. to 2s. 11d. Heavy naphtha, North, 2s. 11d. to 3s. Creosote, in bulk, North, 4¼d. to 4⅜d. Heavy oils, in bulk, North, 5d. Carbolic acid, 60 p.ct. East and West Coasts, 3s. 6d. naked, nominal. Naphthalene, £25 to £30; salts, £6 to £7, bags included. Anthracene, "A" quality, 4d. to 6d. per minimum 40 p.ct.; "B" quality, 1½d. to 2d.

Resumption of Simple Hire

¶ The general resumption of Simple Hire will mean a big increase in the demand for Gas Stoves of PROVEN ECONOMY.

¶ The Davis Gas Stove Co., Ltd., are anticipating this demand, and are ready to book orders (for immediate or forward delivery) for any of their well-known and efficient Hiring Cookers and Gas Fires.

¶ Practically "pre-war" attention is now assured.

THE DAVIS GAS STOVE CO., LTD.,
60, Oxford Street, London, W. 1.

FROM A MARKET CORRESPONDENT.

Tar Products.

There is still a good amount of uncertainty prevailing in the tar product markets, especially in Provincial centres. It is now practically certain that things will not settle down this side of the New Year, and prices in the majority of cases are more or less nominal pending adjustments in conformity with the changed position. These cannot take place immediately, but must of necessity require some time, as the Government control on the trade is only coming to an end gradually; and in regard to some things it may still last for quite a long time. To start with, the coal control cannot be abolished just yet, and may easily continue for another six months. There is a good demand for creosote, which is likely to expand; but fuel oils are rather uncertain. Control on the latter is likely to be withdrawn almost at once. During the last two years the total quantity of fuel oil purchased for Admiralty needs was approximately 300,000 tons. London pitch is steady and without change. Provincial prices are again harder with the prospect of better shipping facilities. South Wales buyers wish to make sure of some 300,000 tons at moderate prices next year; and the Coal Controller is anxious that the trade there should be supplied in order to make use of the enormous quantities of small coal in the district. The idea seems to be that all pitch-producing centres should contribute, and that differences in railway rates should be overcome by pooling. Such a policy, however, would bear unfairly upon London producers, since coal costs them so much more than is the case with Midland and North Country producers. Solvent naphtha is relatively steady at 3s. 9d. per gallon; but business is almost entirely of a hand-to-mouth nature, in view of the possibility of an early decline in values. Heavy naphtha and the naphthalenes are unchanged. Makers are asking higher prices for toluol, which is finding buyers in the dye industry, and the position in benzol is not without considerable interest. The controlled price has for a long time been of an unremunerative nature; but, with the removal of control, 90's should at least be worth as much as petrol. Unless the cause of complaint is removed at once it will not be possible for the trade to make good the losses already incurred. Efforts are again being made to bring the product more or less under the control of the petroleum interests, as noted in these reports some months back; but this should not be allowed, as benzol is a natural asset of proved value, not only as a motor spirit, of superior thermal value, but also in the dye industry, which is now to be protected. The situation is one which should have the attention of all producers. Individual action, as I have remarked before, is useless—a united front is necessary if satisfactory results are to be obtained. Carbolic acid, cresylic acid, anthracene, and aniline oil are without change. The range of quotations is as follows:

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. per gallon; crystals 40% 1s. 8d. to 2s. per lb.

Crude Tar: London 39s. to 41s.; Midlands 33s. to 35s.; North 32s. to 34s. per ton *ex* works.

Pitch: London 65s. per ton f.o.b. works; East Coast, 38s. to 42s.; West Coast, 41s. 6d. to 43s. f.a.s.; Manchester, 41s. to 42s.; Clyde, 41s.; South Wales, 45s. to 46s. per ton.

Solvent Naphtha: London 3s. 9d. to 4s.; North and Midlands 3s. 3d. to 3s. 6d. per gallon.

Crude Naphtha: Naked 30% 8½d. to 8¾d.; North 6¼d. to 6½d.

Heavy Naphtha: London 3s. to 3s. 6d.; Provincial 3s. 3d.

Naphthalene: Refined £28 per ton nominal; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 4d. to 4¼d. (Government price, 75s. per ton f.o.b.—equal to 4⅜d. per gallon); heavy oil, 4¼d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 3s. per gallon; 97-99%, 3s. 3d. to 3s. 6d. per gallon, casks included, *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

The trade is somewhat anxiously discussing the duration of official control; but it is hardly likely that there can be any relaxation until the spring, for agricultural demands have already been arranged upon a scale which would easily absorb the bulk of the output. Allied requirements may, however, receive more liberal treatment, although the outlook for exports generally is not very promising. A certain amount of ammonium nitrate is available as surplus from munitions requirements, and it is quite likely that the export of this in place of sulphate will be allowed to Allied and neutral buyers, whose demand is apparently increasing. Meanwhile, movements continue on a normal scale. The home trade is being developed, and it is hoped that the demand will increase further; hence it is not yet possible to estimate what, if any, quantity of sulphate will be surplus to our requirements. Ammoniacal liquor is uncertain.

Relaxation of Priority for Government Work.—The Minister of Munitions gives notice that all incomplete contracts for the Admiralty, War Office, and Ministry of Munitions which have been placed in classes A or B, including the various grades thereof (P 1, P 2, P 3, P 4, P 5, P 6) under the Order as to Priority of March 8, 1917, need no longer be given the priority attaching to them under the Order, except in cases where the contractor is notified in writing, or by official notice in the Press, that a particular classification is still required to be given to any particular contract. Contractors must notify the ordering Departments of the Admiralty, War Office, or Ministry of Munitions responsible for the contracts in question, of any modification of the original date of completion resulting from this relaxation of the Order as to Priority.

TELEPHONE—
54 & 2296 CENTRAL.
TELEGRAPHIC ADDRESS—
"SCRUBBER, MANCHESTER."

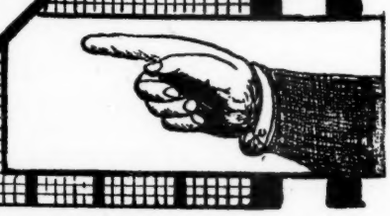
For the latest improvements in Condensers, Purifiers, "Scrubber-Washers," Valves, and Spiral Gasholders

APPLY TO

R. & J. DEMPSTER, LTD.

MANCHESTER.

Temporary London Office—
BLENHEIM MANSIONS, BROADWAY,
WESTMINSTER, S.W. 1.
London Office Telephone
No. Vic. 7426.



Cannock Gas Company and the Council.

A dispute on the question of street lighting has arisen between the Cannock Urban District Council and the Cannock, Hednesford, and District Gas Company, Ltd. The Lighting Committee of the Council have met the Directors of the Gas Company; and it is reported that, though generous terms have been offered to the Company, no settlement has yet been arrived at. The Company have been offered 100 p.ct. increase on the prices charged for lighting the lamps in 1916; but they have declined to accept these terms. The Lighting Committee have, it is stated, made it very clear to the Directors that, by their attitude, they were forcing the Council to adopt electric lighting in the district. Compensation is claimed by the Company because the lamps have remained idle for the past two or three years; but the Council deny any liability for this, urging that it was not through any fault of theirs the lamps were not used. As this was one of the consequences of the war, the Council contend that the Company should bear their share of any loss that has thus accrued. The Company have written stating that they intended to charge a rental for the use of lamps, standards, &c., of 16s. each for small lamps and 32s. for large ones; the Council to be responsible for the lighting, extinguishing, and maintenance. With the object of arriving at some amicable arrangement the Council have decided to approach the Company again.

Gas Oil and Petrol Prices Reduced.—As a result of the improved shipping position, the following reductions in the price of petroleum products are officially announced: From Dec. 16 gas oil is reduced 7½d. per gallon, and fuel oil £4 per ton. From Jan. 1 petrol will be reduced 3½d. per gallon, and kerosene 4d. per gallon. A Board of Trade Order will shortly be issued to this effect.

South Australian Gas Company.—Increased profits were shown by the South Australian Gas Company for the financial year ended June 30. The net profit was £63,487; and after allowing for the dividends at the rate of 12 p.ct. per annum, a balance of £3487 was transferred to the special reserve, restoring the total to £47,807, against £46,977 at the end of June, 1916. Last year the reserve was drawn upon to make up the sum disbursed in dividends. The net profit in 1917 was £55,686, compared with £53,548 in 1916. Sales of gas, &c., for the past year represented a total of £296,108, compared with £228,949 for the immediately preceding twelve months. The total expenditure on revenue account was £232,621, against £173,262. In connection with the increased profits, the capital in the business has also expanded. While the share issue is unchanged at £500,000, outstanding bonds total £160,740, compared with £121,500 a year ago. The restrictions in the use of gas imposed as a result of the Newcastle coal strike towards the end of 1917, caused a considerable falling off in sales; but the position was retrieved before the close of the financial year. The difficulty of securing material restricted the increase in connections; and only a small addition to the mileage of mains laid was recorded.

Street Lighting at Lichfield.—The Lichfield City Council have decided to have a certain number of street-lamps lighted, and to accept the tender of the Gas Company of £3 14s. per lamp for the season, or £1 17s. for four months. The Gas Company were, however, unable to tender for the cleaning, lighting, and extinguishing of any of the lamps.

Automatic Lamps in Birmingham.—The Lighting Department of the Birmingham Corporation are engaged on the installation of automatic lighting apparatus in the streets of the city. By the introduction of this system, actuated by clockwork, a material saving in time and labour is, of course, effected. So far 1500 lamps have been fitted with this device.

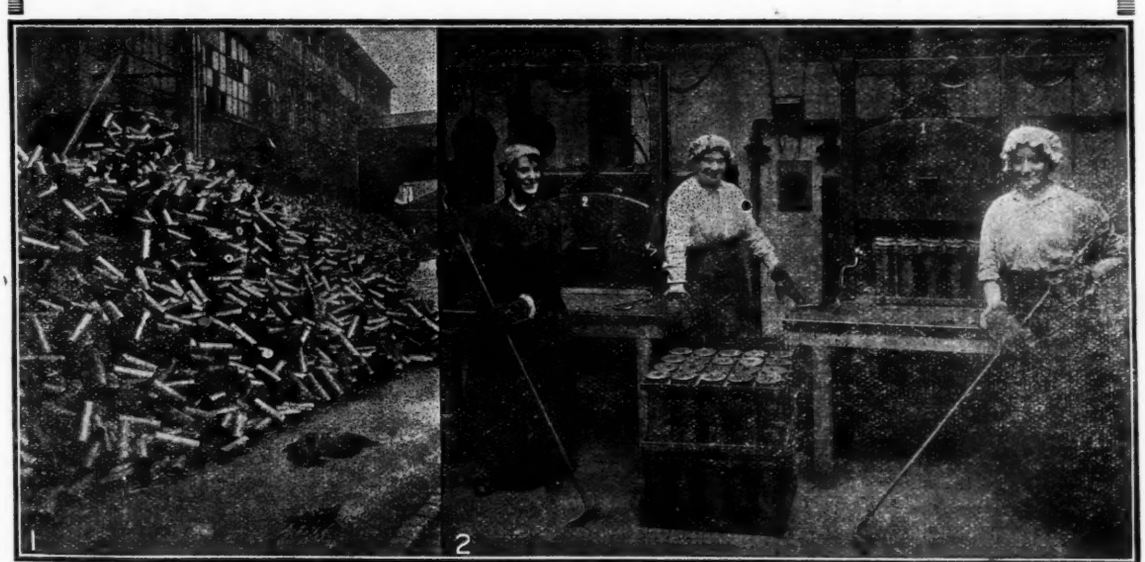
Shop-Window Lighting in Scotland.—The Board of Trade announce that they have suspended the operation throughout Scotland of Part IV. of the Lighting, Heating, and Power Order, 1918 (which prohibits shop-window lighting), from Dec. 20 to Jan. 4, 1919, both dates inclusive. In granting this concession, the Board desire to emphasize that no additional gas or electricity can be granted for the purpose. The Advertisements Lights Order remains in force.

Bolton Gas Explosion.—An explosion, due to a leakage of gas at a house in Shifnall Street, Bolton, last Friday, resulted in five persons—father, mother, and three children—being taken to the Bolton Infirmary, three of them being detained. Thomas Worsley went into a room with a lighted taper, and an explosion occurred immediately. The house had just been fumigated on account of a case of diphtheria; and this prevented Worsley from detecting the smell of the gas which was escaping.

Gas Prices at Stockport.—At a special meeting of the Stockport Trades and Labour Council last Thursday, a strong protest was made against the increase in the price of gas by 9d. per 1000 c.ft.—bringing the charge up to 5s.—and it was decided to ask for a Local Government Board inquiry. One of the delegates said they did not want an inquiry by a Committee composed of members of the Town Council, because they might not get the information that they asked for. Another delegate expressed the opinion that the Gas Committee should be cleared out.

Street Lighting Changes at Halifax.—A lively debate took place at the Halifax Town Council meeting last week, on the subject of street lighting, arising out of a proposal of the Watch Committee that one lamp in every three should be lighted. Mr. Court, in moving the lighting of 50 p.ct. of the lamps, said Halifax was the worst lighted town in the West Riding, despite its bad corners and steep gradients. The amendment was seconded by the Chairman of the Gas Committee, who said they were bombarded with demands for better street lighting. Sir Fredk. W. Thompson urged economy, and spoke of the very low position of gas lighting in the priority list of industries to be supplied with coal. The Mayor also urged caution, in case they might find themselves altogether without gas by March. Eventually, the amendment was carried by 23 votes to 21.

Gas in War Time Industries



No. 16.—18-pdr. Cartridge Cases. Huge quantities of these Cartridge Cases have been regularly salved from the Western Front and rendered fit for use again by the aid of Gas. Illustrations show (1) Pile of Cases awaiting renovation and (2) "Richmond" Gas Furnaces in which the Annealing process is carried out.

THE RICHMOND GAS STOVE & METER CO., Ltd.,
WARRINGTON and LONDON.

Dublin Gas-Stealing Case.

Wm. A. Wilson was charged at the Dublin Southern Police Court with stealing gas, the property of the Alliance and Dublin Consumers' Gas Company, and causing a pipe to be laid without the Company's consent. The case for the prosecution was that defendant had taken premises for election purposes; that there were some fittings in the place which were disconnected; and that, without informing the Company, he had the main service-pipe connected with the house supply-pipe, and used gas. There was no meter in the house; and the gas was passing in without any means of registration. The defence was that the rooms were let to an Election Committee, and Wilson was not responsible. Mr. Swift, the Divisional Magistrate, said defendant would be very much shocked if he were charged with picking pockets; but he could see no difference between such an offence and that on the charge-sheet, for this was a case of picking the pocket of the Gas Company. He ordered Wilson to pay a fine of £5, and compensation of £10 to the Company.

Maximum Price at Penistone.—An intimation was read at a meeting of the Penistone Urban District Council from the Penistone District Gas Company, of an application made by them to the Board of Trade for power to increase the price of gas. The Council were of the opinion that the present price of 4s. 6d. per 1000 c.ft. was quite sufficient; and the Clerk was instructed to lodge a protest in writing against the application.

The Coal Gas for Motors Competition.—In view of the fact that the Gas Traction Committee have, as already intimated in the "JOURNAL," arranged for a section in connection with the forthcoming British Scientific Products Exhibition at Manchester, the Executive Committee of the Automobile Association have decided to postpone until Jan. 31 the closing date for receiving entries for the Association's £1000 competition for the best method of using coal gas as a motor-car propellant.

Gas Economy in London.—It was stated in last Friday's "Times" that an official investigation of gas-works reveals a large reduction of consumption, due to household economy. The Wandsworth Gas Company show a reduction of 6·6 p.c. on the output for November as compared with November, 1917. About 5 p.c. of this is attributed to household economy. The Commercial Gas Company, who serve the industrial East-end, report a reduced output of between 4 and 5 p.c., of which about 2 p.c. was effected in the household. The Gas Light and Coke Company, who cover about one-third of the London area (some 120 square miles), show an approximate domestic reduction of 7¼ p.c.; and the South Metropolitan Gas Company a reduction of 14 p.c., of which 5 p.c., it was added, is estimated as domestic. The aggregate saving is all the more gratifying since last November was colder than November, 1917, and included a succession of fogs.

The Gas and Electricity Restrictions.

On the 5th inst., Mr. H. Faraday Proctor (Hon. Secretary of the Incorporated Municipal Electric Association) wrote to Mr. Gridley (the Director of Electric Power Supply) saying that at a meeting of the Council of the Association, there was considered a letter from the Borough Electric Engineer of Halifax in which the writer remarked: "It is presumed the chief reason for encouraging the use of gas—namely, the importance for war purposes of the residuals from the gasification of coal—has now lost its force with the reduction or cessation of the demand for explosives." The Council requested the Secretary to write to Mr. Gridley asking whether he would secure freedom of choice in the use of gas or electricity to consumers, or prospective consumers, in preference to the existing arrangement which favours the utilization of gas, due to war requirements. To this Mr. Gridley has replied: "The fact that a gas supply may be available on the premises need no longer be a reason for declining to entertain applications for supplies of current for domestic purposes. In modifying to this extent the restriction which has hitherto held, I would remind you that, until the coal situation has materially improved, the Electricity (Restriction of New Supply) Order, 1918, must unfortunately continue in operation."

Irish Gas-Workers' Strikes.—The general workers' strike in Armagh, which involved the workers in the gas and lighting departments, and caused a good deal of inconvenience through the suspension of supplies, has now been amicably settled. Similar inconvenience arose in Ballymena, owing to a strike of the employees at the municipal gas-works; but steps were at once taken towards a settlement, with satisfactory results.

Athlone Gas Undertaking.—Mr. A. C. Ellis, Irish Local Government Board Auditor, in his report on the accounts of the Athlone Urban Council for the year ended March last, states that the amount due to the gas account from revenue was £572, as compared with £425 last year, while the debts due by sundry creditors amounted to £22, compared with £205. The balance in favour of the gas account was £545, as against £732. The receipts amounted to £4468, and the expenditure to £4655, as compared with £4192 and £3982 respectively. Debts due to sundry creditors were given at £4025, against £3477. Mr. Ellis recalls that in his report last year he suggested an increase in the price of gas in order to meet the high cost of coal and the abnormal rise in wages. A short time ago the price was increased from 6s. 5d. to 9s. 3d. per 1000 c.ft. He regarded it as a pity that the Council did not take action two or three years ago, as by their doing so consumers would not have been called upon to pay such a large increase all at once, and the Council would have been in a position to reduce their liabilities gradually. The financial condition of the gas-works called for economy in every way; otherwise, Mr. Ellis adds, the works would have to be closed.

SAWER & PURVES,

THE POSITIVE DRY PREPAYMENT METER

MANCHESTER & NOTTINGHAM.

Drogheda Gas Price.—The Local Government Board for Ireland intimated to the Drogheda Corporation last week that they proposed making an Order authorizing them to increase the price of gas from 5s. 6d. to 6s. per 1000 c.ft. The Mayor said the application was that they should have liberty to increase the price to 6s. 6d.; and the rate now proposed would leave a very small margin for carrying on the gas-works. It was decided that the increase should be imposed; and Mr. Dolan expressed a hope that the quality of the gas supplied would be improved.

Colonial Gas Association, Ltd.—At to-day's annual meeting of the Association, the Directors will report that, as compared with the previous year, the total gas sales for the year ended June 30 last exhibit an increase of 12·14 p.ct. The accounts show that, including the balance of £2333 brought forward from the previous year, and after providing for debenture and other interest, as well as for renewals and depreciation, and deducting the dividend paid on the preference shares for the half year ended Dec. 31 last, there remains an amount available for distribution of £12,439. The dividend on the preference shares for the half year ended June 30 was paid on Nov. 1; and the Directors now recommend payment of a dividend on the ordinary shares of 6¼ p.ct. (less tax) for the year, carrying forward to next account £3363.

Coal Shortage at Bangor (North Wales).—The supply of coal to the Bangor Gas-Works is so much less than was the case a year ago that considerable anxiety is felt in regard to the carrying on of the undertaking. The City Council last week, on the recommendation of the Gas Committee, decided to inform the North Wales Coal Supplies Committee of the critical state of affairs, and to inform them that, unless these circumstances were improved, a complete stoppage of the gas supply at an early date was inevitable. They also urged every consumer of gas to be as economical as possible.

Meeting the Demand at Loughborough.—Speaking at a meeting of the Loughborough Town Council, Mr. W. F. Charles (the Chairman of the Gas Committee) said they had increased their profit by £141 over the corresponding half year, and had met increased charges amounting to £2590. Coal had cost £1800 more, and wages and bonuses £770. But for mixing the blue water gas with the ordinary gas, they could not have met the demand. By this plan, they had saved a considerable sum of money and had cut down their coal supply. The gas supplied was of good quality, and actually better if people would use incandescent mantles. They could not go back to old methods which were wasteful. With gas up only 4d. per 1000 c.ft., the consumers had been saved thousands of pounds.

STOCK MARKET REPORT.

THERE is no change to report in the state of things on the Stock Exchange from what it was a week ago; the same factors—Election and Christmas Holidays—being, of course, dominant in all the plenitude of their power. The first-named is now practically over and done with; but the chances of any revival of business until the second has also faded away into a memory are beyond praying for. Markets are, and will continue, marking time in a humdrum way; but they hold very steady, all things considered—except here and there in speculative lines under special influences.

Thus the general tone was on the whole favourable, and the gilt-edged market showed firmness. In Home Government issues, the 5 p.ct. Loan was firm throughout the week, and closed unchanged. Short-dated Bonds were in demand, having regard to their issue terminating at an early date, and Exchequer Bonds also were in request. Home Rails advanced on labour settlement; but they moved irregularly later on. Canadians were doubtful; but Argentines improved.

In the Foreign Market, the feature was the firmness of French Loans; and Belgians were inquired for. Japanese was steady; but Russians were not in favour. In Miscellaneous there were ups and downs; Breweries being apparently in best odour.

Business in the Gas Market was every bit as quiet as in the week before, if not more so, although a few more issues were dealt in than in the former period. But the tone of the market was quite favourable, notwithstanding the inertia; and every change in quotation was for the better. Gas Light ordinary rose 1, and the debenture 2, South Metropolitan 1, the debentures of Commercial, Brentford, and Tottenham 1 each, South Suburban 1, Hornsey 5, Metropolitan of Melbourne 1, and Bombay and Monte Video ¼ each.

Bargains done for cash during the week were as follows: On Monday, British 31⅞, 32, 32¼, Cape Town 4, Continental Union 51, European 13¾, Gas Light ordinary 72, 72¼, 72⅓, 73, ditto maximum 55½, 55⅞, 56, Monte Video 9¼, 9⅜, 9½, Primitiva 44s. 9d., ditto preference 72s. 6d., South Metropolitan 76, South Suburban preference 76. On Tuesday, European 13 1/16, Gas Light ordinary 72⅞, 73, 73⅛, Imperial Continental 122, Monte Video 9⅛, Primitiva 45s. 10½d., ditto preference 72s. 6d. On Wednesday, Bombay 5⅞, European 13⅞, Gas Light ordinary 72⅞, ditto maximum 56, 56½, Imperial Continental 122½, Metropolitan of Melbourne 95½, Monte Video 9½, Primitiva 45s. 10½d. On Thursday, Alliance and Dublin debenture 63, Continental Union preference 74, Gas Light ordinary 72½, 73¼, 73½, ditto preference 69, ditto debenture 56½, Imperial Continental 121½, 122½, 124, Primitiva preference 72s. 6d., South Metropolitan 76, ditto debenture 56, Southampton 69. On Friday, Continental Union 50, European 13½, Gas Light ordinary 73½, ditto debenture 56, Imperial Continental 121, 121⅞, 123, Primitiva 42s. 6d., ditto preference 71s. 3d., South Metropolitan debenture 56½.

In the Money Market, conditions ruled easy. The Bank rate is 5 p.ct., as fixed on April 5, 1917.

The Directors of the European Gas Company, Ltd., have decided to pay on Feb. 1 an interim dividend, free of income-tax, of 5s. per share, or 2½ p.ct.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	55—60	..
1,551,868	"	April 8	2½	4⅜	Alliance & Dublin Ord.	59—64	61—66	..
874,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	62—67	63
280,000	5	April 22	7½	8%	Bombay, Ltd.	5⅞—6⅛	5⅛—6	5⅞
50,000	10	Feb. 26	16	11%	Bourne-mouth Gas and Water { 10 p.c.	25—30	22—24	..
883,110	10	"	7	7%	B 7 p.c.	15—15½	10½—11½	..
115,000	10	"	6	6/-	Pref. 6 p.c.	13¾—14	9½—10⅝	..
159,740	—	—	—	4%	4 p.c. Deb.	..	66—68	..
992,045	Stk.	Feb. 26	14	11%	Brentford A Consolid.	261—266	78—81	..
734,920	"	"	11	11%	Do. B New	204—209	70—73	..
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	77—82	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—93	62—64*	..
217,380	"	Feb. 26	11	8½%	Brighton & Hove Orig.	208—213	140—145	..
244,200	"	"	8	5½%	Do. A Ord. Stk.	154—159	97—102	..
580,000	20	Mar. 26	12½	22/6	British	44—45	31½—32½	31½—32½
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	64—66	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	51—54	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	3⅞—4½	4
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	7½—8½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
167,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79—81	..
1,518,280	"	Feb. 12	5/9/4	86/-	Commercial 4 p.c. Stk.	106—108	62—67	..
560,000	"	"	5¼	80/-	Do. 3½ p.c. do.	103—105	58—63	..
475,000	"	June 11	8	8%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	50—55	50—51
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	70—75	74
278,400	—	—	—	10½%	Croydon B and C 7 p.c.	..	135—140	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	128—125	95—100	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	80—88	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	13—14	13¾—18⅞
16,298,975	Stk.	Feb. 10	4/17/4	29/4	Gas { 4 p.c. Ord.	98—102	72—74	72—73½
2,600,000	"	"	3½	3½%	Light { 3½ p.c. max.	76—79	55—57	55½—56⅝
4,062,385	"	"	4	4%	and { 4 p.c. Con. Pref.	96—99	68—70	69
4,674,850	"	June 11	8	8%	Coke { 8 p.c. Con. Deb.	72½—74½	55—57*	56—56½
180,000	"	"	10	10%	10 p.c. Bonds	..	..	..
258,740	"	Mar. 12	5	2⅜%	Hastings & St. L. 8½ p.c.	87—89	45—50	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16¾	7½—8½	..
86,600	—	—	—	9½%	Hornsey 7 p.c.	..	117—122	..
131,000	Stk.	Mar. 12	7½	6½%	Ilford A and C.	151—154	92—97	..
65,780	"	"	6⅔	4⅜%	Do. B	115—118	70—75	..
65,500	"	June 26	4	4%	Do. 4 p.c. Deb.	92—94	62—65	..
4,940,000	"	May 14	9	4½%	Imperial Continental	150—160	121—126	121—124
1,285,000	"	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	71—73	..
235,342	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	93—98	..
2,498,905	"	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A	211—213	82—84	..
					{ B	145—148		
306,088	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
75,000	5	June 11	6	3%	Malta & Mediterranean	4½—4⅝	3½—3⅞	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	90—97	96½
541,920	20	May 28	4	5/-	Monte Video, Ltd.	11½—12	9½—9⅞	9½—9½
1,875,892	Stk.	July 29	4½	3⅛%	Newcastle&Gatsh'd Con.	98½—99½	70—71	..
529,705	"	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—88	59—61	..
55,940	10	Feb. 26	7/14/0	7½	North Middlesex 7 p.c.	14—15	9½—10½	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	102—105	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅞	4—5	..
60,000	50	Feb. 26	18	9%	Porisea, Island B	128—131	78—83	..
100,000	50	"	12	6%	Do. C	118—121	73—78	..
52,000	50	"	10	6%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	2½—2⅝	42/6—45/10½
499,950	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅝—5	3⅝—3½	71/3—72/6
521,500	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	74—76	..
—	—	—	—	4%	Do. " 1911	..	52—57	..
846,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	55—60	..
150,000	10	May 14	6	6/	San Paulo { 6 p.c. Pref.	10½—11	7½—8	..
125,000	50	July 1	5	5%	5 p.c. Deb.	47—49	40—42	..
185,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	170—173	..
209,984	"	"	10	10%	Do. B	223—224	170—173	..
528,500	"	"	10	10%	Do. C	220—222	168—172	..
90,000	10	May 28	9	6/-	South African	10½—11½	13—14	..
6,609,895	Stk.	Feb. 10	5/4/0	32/-	South Met. 4 p.c. Ord.	111—115	76—78	76
250,000	"	July 12	—	5%	Do. Pref.	..	91—93	..
1,895,445	"	July 10	8	8%	Do. 3 p.c. Deb.	72½—74½	55—57	56—56½
224,820	"	Feb. 26	8½	6%	South Shields Con. Stk.	157—159	114—116	..
952,795	"	"	6	3¾%	S'th Suburb'n Ord. 5 p.c.	114—116	74—77	..
60,000	"	"	5	5%	Do. 5 p.c. Pref.	110—112	75—78	76
135,000	—	—	—	3½%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	85—87	..
647,740	"	May 14	5	3%	Southampton Ord.	99—102	67—70	69
120,000	"	Feb. 12	7½	5½%	Tottenham { A 5 p.c.	185—188	92—97	..
722,275	"	"	6	4%	District { B 3½ p.c.	115—117	67—69	..
121,255	"	June 26	4	4%	4 p.c. Deb.	87—89	61—63*	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
142,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
226,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	87—88	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	"	Feb. 26	8⅔	68/9	Wandsworth A 5 p.c.	151—156	90—95	..
255,636	"	"	6⅔	48/9	Do. B 3½ p.c.	129—134	70—75	..
108,075	"	"	5/17/3	44/7½	Do. C 3½ p.c.	110—115	70—75	..
853,000	"	"	6½	42/6	Wimbledon 5 p.c.	117—122	70—75	..
98,000	"	"	6½	48/9	Epsom 5 p.c.	121—126	72—77	..
88,416	"	June 26	8	8%	3 p.c. Deb. Stk.	48—49	49—52	..

* *Ex div.*

"Pleno" Gas for Oldham.—The Oldham Town Council, at their last meeting, decided to adopt the "Pleno" gas system of Mr. George Helps. The Gas Committee are unanimously in favour of this course being taken.

Coke-Oven Gas Supply at Sheffield.—In their report to the shareholders, the Directors of the Tinsley Park Colliery Company, Ltd., mention the agreement which has been made for the Sheffield Gas Company to take the surplus gas from the Company's coke-ovens. On the 9th inst. this gas was turned into the main for conveyance from the coke-ovens to the Grimesthorpe works of the Gas Company. The quality so far is quite satisfactory.

A brother and sister, aged respectively 74 and 71, who lived together in a house overlooking Wandsworth Park, Putney Bridge Road, not having been seen for some days, the premises were entered, and both were found dead in their rooms. The house was filled with gas, which had escaped from a bracket in the kitchen.

Some notes on the selection of chain gear, which are being issued by Messrs. Hans Renold, Ltd., of Didsbury, Manchester, with the object of assisting engineers and draughtsmen to select and specify chain drives for normal conditions, include much data presented in as simple and concise a manner as has been found possible. There are also a number of practical hints upon the erection and care of drives of this type.

Over £2000 has been subscribed in the Manchester Corporation Gas Department for war relief funds, of which £1042 was given to the Lord Mayor's Relief Fund in the early stages of the war. When this fund was closed in July, 1915, the officials of the department established their own fund, which is still in existence, and is being applied in relieving the dependants of those officials who have been killed or maimed in the war. Then there is the Tobacco and Cigarette Fund, which, by means of a penny a week subscription, has raised a considerable sum, thereby ensuring a continuous supply of tobacco and cigarettes for the soldier and sailor officials of the department.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND GENERAL MANAGER, South Shields Gas Company. Applications by Jan. 4.
CHIEF ENGINEER. Metropolitan Water Board. Applications by Feb. 1.
MANAGER (Coke Ovens, &c.). Bearpark Coal and Coke Company, Middlesbrough.
SUPERINTENDENT (Water Gas Plant). Leeds Gas Department. Applications by Dec. 24.
WORKING MANAGER. St. Ives Gas-Works. Applications by Dec. 21.
FOREMAN. No. 6553.
FOREMAN (Maintenance of Offices). No. 6546.
SHIFT CARBONIZING FOREMAN. No. 6552.
FOREMAN FITTER. Redcar Gas-Works.
BRASSFINISHERS. No. 6555.
GAS FITTER. No. 6554.

Appointments, &c., Vacant (*Continued*).

F.A. MACHINE DRIVERS. No. 6558.
LEADING STOKER. Holmfirth Gas-Works.
WATER INSPECTOR. Aldershot Gas, Water, and Lighting Company. Applications by Dec. 28.

Appointments, &c., Wanted.

COKE OVEN AND BYE-PRODUCTS WORKS MANAGER. No. 6550.
DISTRICT INSPECTOR. No. 6548.
ENGINEER AND MANAGER. No. 6532
ENGINEER AND GENERAL MANAGER (Large Gas-Works). No. 6557.
AGENCY (Gas Plant, &c.). Verax, care of Pottle's, Royal Exchange.

Plant, &c., Wanted.

DRUMS FOR BENZOL OR PETROL. No. 6557.

Plant, &c., for Sale.

RETORT BENCH FITTINGS. Southampton Gas Company.

TENDERS FOR

Oxide Residues.

LEVINSTEIN, LTD., Blackley, Manchester.

Tas and Liquor.

ALDERSHOT GAS, WATER, AND LIGHTING COMPANY. Tenders by Dec. 20.
GAINSBOROUGH GAS DEPARTMENT. Tenders by Dec. 21.
HARWICH GAS COMPANY. Tenders by Jan. 6.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

CHRISTMAS HOLIDAYS.

In view of the CHRISTMAS HOLIDAYS, the next issue of the "JOURNAL" will be published on Monday instead of Tuesday. Communications and Advertisements for this issue should be received at the Office by the first post on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under (about 40 words) 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	28/-	15/-	8/8
	Credit Rate:	32/-	16/-	9/6
Abroad (in the Postal Union) Payable in Advance		32/6	17/-	10/-

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.
All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON
FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE
PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C. 2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London." 'Phone: Palmer's Green 608.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams—"SATURATORS, BOLTON." Telephone 0848.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

BENZOL PLANTS FOR GAS-WORKS.

BAGLEY, MILLS, & CO., Ltd.,
92, Victoria Street, Westminster, S.W. 1, Invite inquiries from all Gas-Works making 75 million cubic feet and upwards per annum.

MEWBURN, ELLIS, AND PRYOR.
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent, London." 'Phone: 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

"FERROX." "FERROX." "FERROX."
A BRITISH Oxide Cheaper and Better than Bog Ore. 35 per cent. Water, 75 per cent. Ferric Hydrate.
For Sale outright or on Loan.
OXIDE LIMITED, Brentford, MIDDLESEX.

TAR AND GAS LIQUOR WANTED
IN LONDON DISTRICT.

THOMAS CLAYTON (Oldbury), Ltd.,
BRENTFORD, W.
Telegrams: Canal, Brentford. 'Phone: Ealing 17.

OXIDE OF IRON.
SPENT OXIDE WANTED.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

SULPHURIC ACID.
SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD., Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—
BALE AND HARDY,
39, VICTORIA STREET, WESTMINSTER, S.W. 1.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

H. MITCHELL, FOR PATENT SLOT METER PAD & OTHER LOCKS. London Office: BLENHEIM MANSIONS, BROADWAY, WESTMINSTER, S.W. 1. **R. & J. DEMPSTER, LTD.,** MANCHESTER. 7 & 8, LEIGHTON ROAD, KENTISH TOWN, N.W.